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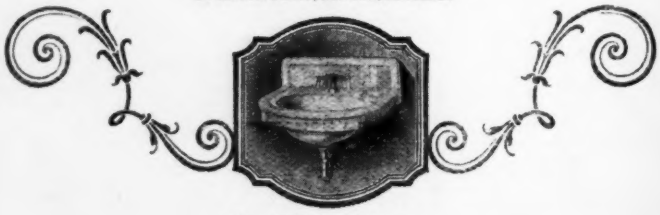

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THE U. S. NAVAL WAR COLLEGE, NEWPORT, R. I.

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THE U. S. NAVAL WAR COLLEGE, NEWPORT, R. I.

THE LINE PERSONNEL UNDER THE PRESENT LAW

BY CAPTAIN ROY C. SMITH, U. S. NAVY, (Retired)

IN the personnel situation as it now exists it is desirable to know as clearly as possible whither the present law is tending. Tables of figures may be used but they are hard to follow and are confusing at that. If the same information can be put into a simple graphic diagram, the result is more apparent and more satisfactory. Such will now be attempted.

The main features will be a diagram in which the abscissae will be average ages and the ordinates the number on the list of the corresponding ages. The sum of successive ordinates at unit intervals will be the total number on the list for the corresponding total interval. By making suitable intervals the grades may thus be represented graphically, from ensign to rear admiral. The area of the whole diagram will be the authorized strength of the line and the areas of the subdivisions will be the strength of the grades.

The boundary curves in the diagram are drawn for a three per cent constant annual loss; that is, each class, or date, or average age, loses three per cent of itself each year, from ordinary casualties, resignations, etc. There are more resignations earlier, more casualties later, keeping the percentage about constant. The figure was obtained from the records of many years and is what is ordinarily used.

With such a limiting curve there are five quantities that are interconnected for any given subdivision or grade. They are the entering strength, the percentage loss, the years in the grade, the

total number in the grade and the leaving strength. They may be represented algebraically as follows:

x = number of years in grade
y = strength at interval x
y_o = entering strength
r = ratio of strength in any year to preceding year = $1-l$, where l = percentage loss
A = total number in x years = area of curve
Whence $y = y_o r^x$ (1) (Contains no A)

Next, the number entering each year, with the total constant, is the number leaving plus the loss during the year, or

$y_o = y + lA = y + (1-r)\,A$ (2) (Contains no x)

These are the fundamental equations, involving the five quantities. If any three are known, the other two can be found.

Equation (1) contains no A, equation (2) no x. Eliminating the three remaining quantities, one after the other, gives an equation for determining one of any four quantities, three being given, thus:

Eliminating y_o
$y = [y + (1-r)A]r^x$ (3) (Contains no y_o)
Eliminating y
$(1-r^x)y_o = (1-r)A$ (4) (Contains no y)
Eliminating r
(2) becomes $Ar = A + y - y_o$ and $A^x r^x = (A + y - y_o)^x$ whence, from
(1) $A^x y = y_o (A + y - y_o)^x$ (5) (Contains no r)

Each of the above five numbered equations contains four quantities. Hence with three quantities given the suitable equation can be selected for obtaining a fourth, whence the fifth can be obtained from one of the others.

Obtaining the data for the diagram will now be described. The age for commissioning as ensign is taken at twenty-two. This is obtained by taking the average age of a number of recent ensigns, as given in the *Navy Register*. They serve three years as ensign, thence are promoted to lieutenant (j. g.), in which grade a minimum service of three years is required. Thence their promotion depends on vacancies only to lieutenant commander, and after that on vacancies and selection.

The age-in-grade retirements virtually determine the age of promotion to the three higher grades. The selections for promotion are made for the coming year, which brings the average somewhat below the retiring age, but not much, as the selections cannot go far down, owing to the service-in-grade qualifications for

eligibility. This is illustrated by the dotted lines in the grades of lieutenant commander and above. This cannot be allowed for accurately in the calculation. By using the retiring age as the limit, the results will be reasonably correct as to numbers, although promotions may occur somewhat earlier than shown, varying according to position on the list when selected. It is to be noted that as four years' service in the grade is a requisite for selection, and as the service in the grades of lieutenant commander, commander, and captain is five years, five years, and six years respectively, the eligible block is within a year of the retiring age for lieutenant commanders and commanders and within two years for captains. It is realized that for every officer selected lower down in the block, one officer higher up must be retired. This is shown where the dotted line crosses the average age line.

The total number 5,499 is four per cent of the present authorized enlisted strength. The numbers in the grades are the authorized percentages of this total. The other numbers will be explained as we proceed. We could start at either end, top or bottom, but we do not know how many midshipmen we need as yet, so by starting with the rear admirals and working down we shall know in the end.

Rear admirals. Known data, $A=55$, $r=.97$, $x=8$ (56 to 64 years). Required y_0 and y. Equation (4) contains y_0, but no y. Hence $y_0=\dfrac{(1-r)A}{1-r^x}=\dfrac{.03\times 55}{1-.97^8}=7.6$

From (1) $y=y_0r^x=7.6\times .97^8=5.96$

Hence about eight enter each year and about six leave.

Captains. Known data, $A=220$, $r=.97$, $x=6$ (50 to 56 years). Required y_0 and y. Solution same as before.

$$y_0=\frac{(1-r)A}{1-r^x}=\frac{.03\times 220}{1-.97^6}=39.5$$

$$y=y_0r^x=39.5\times .97^6=32.9$$

Hence about forty enter each year and about thirty-three leave. Of the thirty-three, eight become rear admirals and twenty-five retire. This last is 11.4 per cent of 220, making a total loss among captains each year of 14.4 per cent (11.4+3.0).

Commanders. Known data, $A=385$, $r=.97$, $x=5$ (45 to 50 years). Required y_0 and y. Solution same as before.

$$y_0=\frac{(1-r)A}{1-r^x}=\frac{.03\times 385}{1-.97^5}=81.7$$

$$y=y_0r^x=81.7\times .97^5=70.1$$

Hence about eighty-two enter each year and about seventy leave. Of the seventy, forty become captains and thirty retire. This last is 7.8 per cent of 385, making a total loss among commanders each year of 10.8 per cent (7.8+3.0).

Other grades. Lieutenant commanders. Known data, $A=770$, $r=.97$. Nothing else known, except that they must be promoted before they are 45. Not enough.

Lieutenants, $A=1787$, $r=.97$. Not enough.

Lieutenants (j.g.) and ensigns, $A=2282$, $r=.97$. Not enough.

But taking these four grades all together, we have, $A=4839$, $r=.97$, $x=23$ (22 to 45 years). Required y_o and y. Solution same as before.

$$y_o=\frac{(1-r)A}{1-r^x}=\frac{.03\times 4839}{1-.97^{23}}=288.2$$

$$y=y_o r^x=288.2\times .97^{23}=143.0$$

Hence about 288 enter each year as ensigns and about 143 leave as lieutenant commanders. Of the 143, eighty-two become commanders and sixty-one retire. This last is 7.9 per cent of 770, making a total loss among lieutenant commanders each year of 10.9 per cent (7.9+3.0).

Next, to complete the solution in the three lower grades:

Ensigns, $y_o=288.2$, $r=.97$, $x=3$. Required y and A.

(1) $y=y_o r^x=288.2\times .97^3=263.0$

From (4) $A=y_o\dfrac{1-r^x}{1-r}=288.2\times\dfrac{1-.97^3}{.03}=838.6$

Hence 263 are promoted after three years, leaving 839 in the grade of ensign.

Lieutenants (j.g.). $y_o=263$, $r=.97$, $A=1443$ (2282-839). Required x and y.

From (2) $y=y_o-(1-r)\,A=263-.03\times 1443$

$=263-43.3=219.7$

From (1) $r^x=\dfrac{y}{y_o}=\dfrac{219.7}{263}=.8354$

$x\log r=\log .8354.\quad x=\dfrac{\log .8354}{\log .97}=5.9$

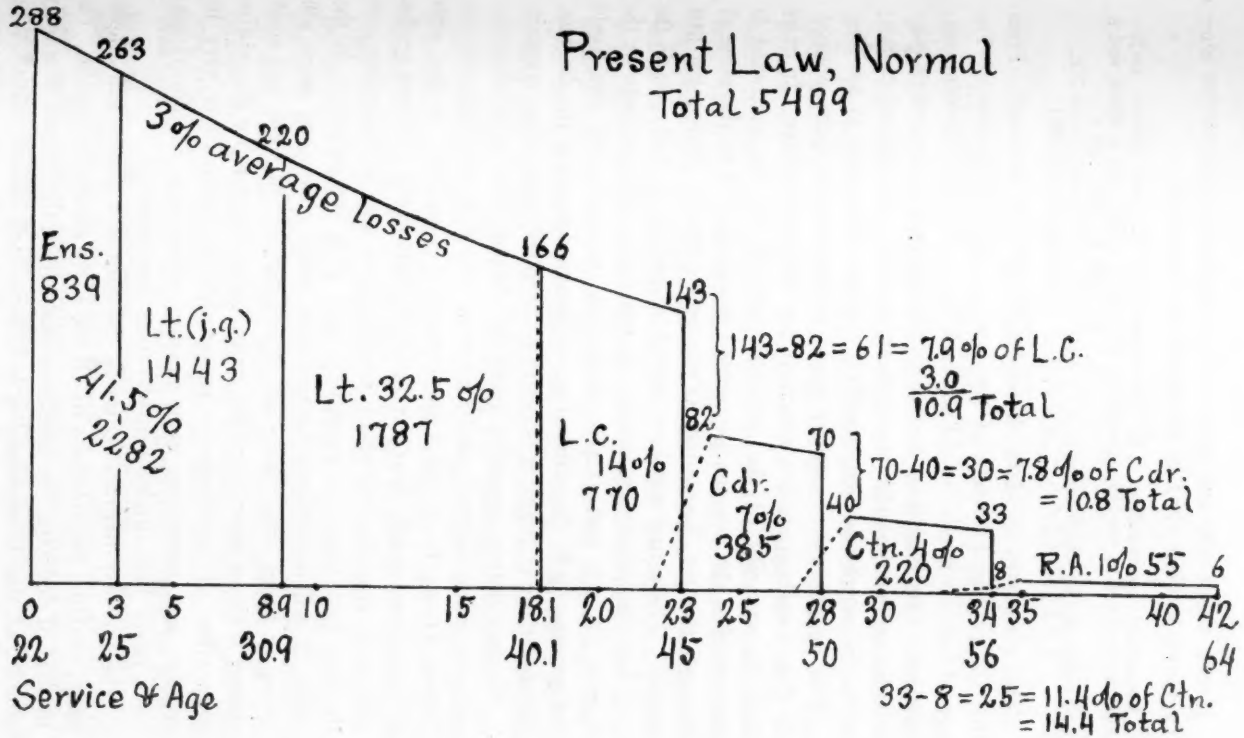
Hence about 220 are promoted to lieutenant after 5.9 years, leaving 1,443 in the grade of lieutenant (j. g.).

Lieutenants. $y_o=219.7$, $r=.97$, $A=1787$. Required x and y. Solution as above.

$y=y_o-(1-r)\,A=219.7-.03\times 1787=219.7-53.6=166.1$

$r^x=\dfrac{y}{y_o}=\dfrac{166.1}{219.7}=.756$

$x\log r=\log .756.\quad x=\dfrac{\log .756}{\log .97}=9.2$


Present Law, Normal
Total 5499
288
263
220
166
143
3% average losses
Ens.
839
Lt.(j.q.)
1443
41.5%
2282
Lt. 32.5 o/o
1787
L.C.
14 o/o
770
Cdr.
7 o/o
385
Ctn. 4 o/o
220
R.A. 1 o/o 55
143-82=61=7.9 o/o of L.C.
3.0
10.9 Total
82
70
70-40=30=7.8 o/o of Cdr.
=10.8 Total
40
33
8
6
0 3 5 8.9 10 15 18.1 20 23 25 28 30 34 35 40 42
22 25 30.9 40.1 45 50 56 64
Service & Age
33-8=25=11.4 o/o of Ctn.
=14.4 Total

Hence about 166 are promoted to lieutenant commander after 9.2 years, leaving 1787 in the grade of lieutenant.

Lieutenant commanders. All five quantities are now known, $x=23-(3+5.9+9.2)=4.9$, $y=143$, $y_o=166.1$, $r=.97$, $A=770$. As a check find A from equation (2), which becomes $A=\frac{y_o-y}{1-r}=\frac{166.1-143}{.03}=\frac{23.1}{.03}=770$.

This completes the data of the diagram shown herewith. From this the principal defects of the law are at once apparent. The age of forty is much too old to reach the grade of lieutenant commander. The length of service in the grades of lieutenant commander and commander is too short, possibly also that of captain; while the service as lieutenant (j. g.) and lieutenant is too long.

The percentage of age in grade retirements is quite unequal. In theory each grade is a reservoir for the grade above. In order that the capacity of the reservoir should not be overtaxed in emergencies, the average percentage losses should be the same all through the list, beginning at the grade where elimination first occurs. The actual numbers would be greater at first, less in the end, but the percentage would be constant. The average of the figures 7.9, 7.8, and 11.4 is about nine per cent, but this would not necessarily be the same after necessary changes in the diagram. Whatever the changes, it is better to keep the percentage constant.

Another defect, apparent from the dotted lines in the diagram, and which was pointed out in a recent article in the PROCEEDINGS, "Some Thoughts on the Line Personnel Situation," is that with selections necessarily near the top of the lists in the different grades (the last year in lieutenant commanders and commanders and the last two years in captains), and with irregularities in the dates, it will sometimes happen that large classes or dates will arrive at times when there are few vacancies in sight and small classes at times when there are more vacancies, making the relative proportion of age-in-grade retirements to promotions very irregular, and sometimes even causing retirements of officers who have never been under consideration for selection.

The finished diagram shows all the data at a glance and graphically, enabling the relations of all the parts clearly to appear. The method of deducing the unknown parts from the known is entirely simple; all that is necessary is to have enough known parts. With this or similar diagrams all promotion problems may be solved.

THREE NAVY CRANKS AND WHAT THEY TURNED

By Captain J. M. Ellicott, U. S. Navy (Retired)

THE writer graduated from the Naval Academy soon after the beginning of our last "Naval Holiday." The navies of the world were entering upon that great revolution in warship construction started by the United States in the building of monitors, wherein wood was abandoned for iron and steel, sails for steam engines, and guns were installed in revolving armored turrets. With that fatuous sense of security born of our peace-loving disposition and our ignorant belief that the breadth of our oceans put us beyond the reach of the new type of warship, our government balked at the enormous expense of building such vessels and decided that we only needed the wooden steam frigates left over from the Civil War to "show the flag" in foreign ports and to protect our citizens during disorders among our then turbulent Latin American neighbors. Building was entirely suspended; navy yards were appraised for sale and navy personnel was put through a drastic process of reduction by promoting only one officer at the head of a grade for every two vacancies in the grade above. In other words, if no casualties occurred in between, it took the retirement of sixty-four rear admirals to promote one ensign to the next higher grade. Under these conditions the personnel of the Navy soon settled down into three distinct groups; the older officers, like Rowen, Porter and the Rodgers, who had made their reputations and reached the height of their careers in the Civil War; the "Coburgers" who, seeing nothing to be gained by striving to excel in their profession, managed through personal influence and favoritism to sit in swivel chairs in comfortable offices in the large social centers amid leisure, feasting and other entertainment, and a third group of those who, having no influence to prevent it, were obliged to eke out their existence on board ships lying for years at a time in foreign ports, or to risk their lives without pros-

pect of reward amid the diseases and disorders of tropical countries.

There were a few belonging to none of these groups, though usually found in the last, who believed that national jeopardy or common sense would some day resurrect the Navy, and that it was their duty to do something to keep the officers and men in training for that day. When these became conspicuous through their activities and propaganda they were called cranks, and it is of three such "cranks" that I am now writing.

One day while I was a third classman at the Naval Academy I was standing with an upper classman in front of our quarters when our venerable-looking, white-bearded Superintendent, a member of the first group mentioned, approached along the sidewalk accompanied by another officer who seemed to be discoursing with unusual earnestness. I also noted that many midshipmen had popped their heads out of their windows to look.

"Who is that officer in whom they seem so interested," I asked.

"Why," said my companion, "that's Commodore Stephen B. Luce, the author of our book on seamanship."

Gazing closely at him I saw a lean, wiry man of medium height, with thin features between iron gray side-whiskers, a prominent, hawk-like nose, thin lips and determined chin, and the most piercing gray eyes I had ever seen in my life, and as he passed I caught the words, "We need an officers' school in the art of war."

This expression, coming from him, astonished me, for I had judged him by his books on seamanship to be one of the most practical men in the Navy, and my youthful mind could not conceive anything practical or practicable in an academic study of the art of war, especially at that unpropitious time; so I then and there began to fear that he was a crank.

He was at that time in command of a little group of wooden sailing ships known as the training squadron which he took on long cruises under sail to train apprentices for seamen, and many were the stories of the nervy maneuvers he performed and of his imperturbability in performing them. One of these I recall and will tell it as I remember it. The squadron was cruising in column early one morning in a moderate gale. The next ship astern of the flagship was a faster vessel and it was only by incessant luffing that she could be kept from overtaking her leader. Her captain, who was

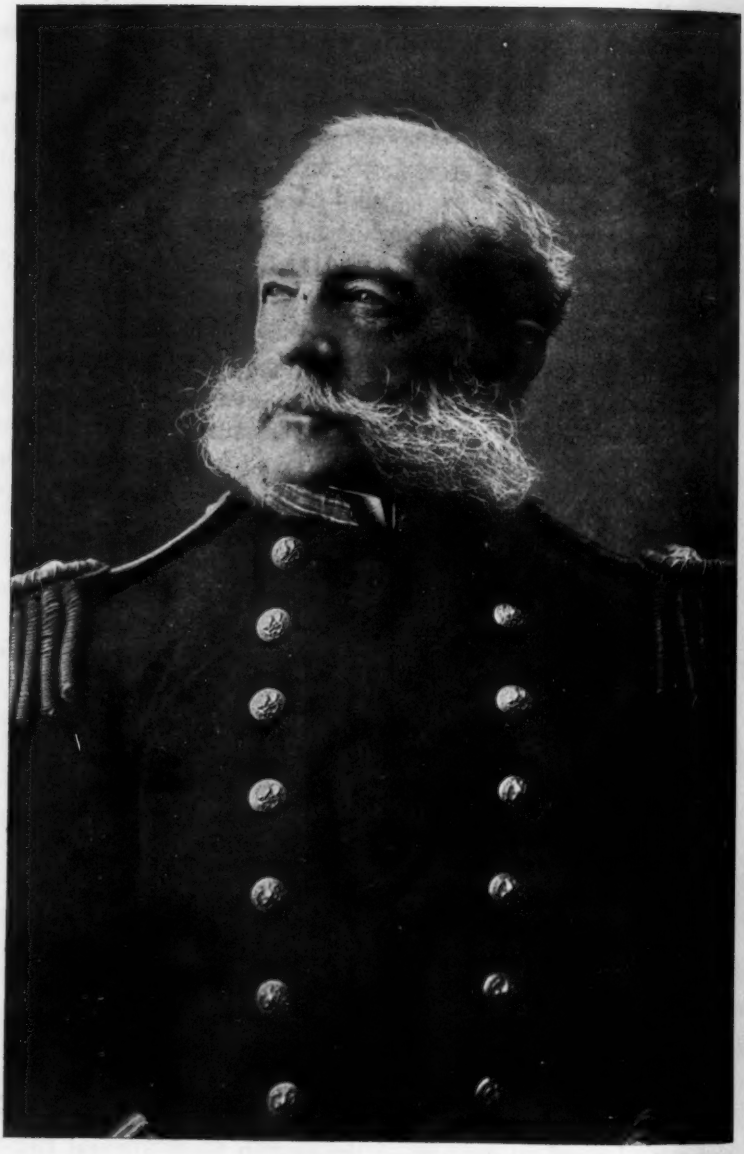
not much junior in rank to Luce, became so nervously afraid of a collision that he posted himself on the forecastle at the very bow of the ship to conn (or direct the handling of her) from that point. While so doing he looked down into the large stern-cabin windows of the flagship and saw the commodore shaving.

"Look here, Luce," he cried out, "I've taken off every sail you will let me and am still in danger of colliding with you every minute. Our jibboom is almost over your taffrail now."

"All right, old man," said Luce, waving his razor at him. "We'll stand by for a bloody bear-off until I get through shaving; then I'll go up and take a look at things."

In my day at the Naval Academy the course was four years at the school and two more years at sea before final graduation. For the two years at sea I was assigned to the steam frigate *Tennessee*, flagship of the North Atlantic Squadron, and while I was in her, Commodore Luce, as acting rear admiral, became commander-in-chief. We immediately ceased to spend the summers at the principal New England watering places and the winters at the New Orleans Mardi Gras, and went into most intensive and, as many seemed to think, most irritating and unnecessary tactical maneuvers. The captains and higher officers were marked on their performance of these as if they were in school and the other officers down to the last midshipman were made to take the deck under steam and sail and put the ships individually through the evolutions of tacking, wearing and making and shortening sail. Throughout all of this Admiral Luce would pace the poop of the *Tennessee*, patting a long spyglass and watching everything with the keenness of an eagle. One day when the squadron was approaching an anchorage near Gardiner's Island, Long Island Sound, in double column and in inverse order to permit the lighter draft vessels to utilize the shoal-water for anchoring close to the shore, the *Yantic*, which was just ahead of the flagship, anchored too soon and collision with her by the *Tennessee* appeared inevitable. Just as the situation seemed hopeless the *Yantic* unshackled and slipped her chain with the end buoyed and steamed out of danger. This quick presence of mind on the part of her captain filled Admiral Luce with delight and he called out to him:

"Well done, W——! I'll give you a four for slipping and a zero for anchoring there!"



Rear Admiral Stephen B. Luce, U. S. N.

Immediately after that anchorage every officer and man, excepting a few on each ship, was sent into camp on the island, and Luce steamed across the Sound with the whole squadron to leave them upon their own resources for a week. That night he sailed a dinghy back across the Sound alone, and, in civilian clothes, attempted to slip past the sentries and get into camp in order to test their vigilance, but was arrested and locked up in the guard tent. Again he was delighted.

On another occasion he put the whole squadron through the most intricate maneuvers among the islands of upper Narraganset Bay. His own ship, being the one drawing most water, caused her captain much anxiety. At one time the latter called from the bridge to the poop:

"Admiral, we have only a foot of water under our keel."

"Just enough, Captain X——, *just* enough, Sir!" the admiral replied.

A little later the flagship actually slid gently and firmly aground as she was passing the end of an island.

"There! Admiral," exclaimed the captain. "Here we are, hard aground. What shall we do next?"

Luce (who knew the tide was rising) answered:

"What time is it, Captain?"

"Just twelve o'clock, Sir."

"Then I think we had better go to dinner."

Luce's home was in Newport, R. I., and whenever the North Atlantic Squadron was maneuvering in the bay he was importuned by the "400" to let his officers attend their big social functions. This always irritated him and he would anchor his squadron far up the bay whenever such an invitation came and give orders that no officer should go beyond signal distance. Once, however, he got caught between two fires, as it were, for in running away from a Newport social function he anchored within reach of another one at Providence. He saw the humor of it, however, and let everybody off duty go to the party, even going himself and entering into the gaiety of the evening with almost boyish enthusiasm. In fact, so completely did he relax from his usual austerity that a lifelong friend, looking at him as he stood in the hilarious crowd of the dining-room with a glass of champagne in his hand, said:

"Stephen, I believe you are tight."

"My dear fellow," said the admiral, "if Stephen B. Luce how can Stephen be tight?"

Probably no one outside of his personal staff, and possibly not even the members of that, knew how persistently and determinedly Luce was working out in those days his plan for the establishment of that school for the study of the art of war, but in everything he did he was leading up to it: by his association in the foundation of the U. S. Naval Institute and by his articles in the PROCEEDINGS of that Institute and in popular reviews; by official recommendations to the Navy Department; by indoctrinating conversations with all officers who showed any realization that the Navy had a future, and by the constant tactical maneuvers in which he so persistently drilled his vessels. Neither did those around him know how his idea was scorned, ridiculed and cold shouldered; how, in fact, he was coming to be looked upon in departmental circles as the arch crank of the Navy. So when his tour of sea duty was over and we youngsters were expecting him to be ordered to some high post in the Navy Department at Washington, we were actually shocked to learn that he was ordered ashore as president of a Naval War College at Coaster's Harbor Island in Narragansett Bay. Coaster's Harbor Island was the site of the poorhouse of the state of Rhode Island and there was nothing on it at this time, when it passed into the possession of the Navy, excepting the old stone poorhouse building and farm.

So, in the presence of a small group of officers from the squadron and a few civilians from Newport, Admiral Luce stood in front of the vacant poorhouse building one morning and read his orders establishing the Naval War College and making him its first president. As we went away and left him sitting on the steps with only his negro mess boy and a suitcase, we youngsters felt extremely sorry for him. We could not realize that those piercing gray eyes of his were seeing far into the future and that that crank was about to turn the greatest war engine this country has ever had.

Meantime another crank had been encouraging his brain to work during those navy doldrums. This was Captain A. T. Mahan. Being without influence, he had been relegated to that third group of officers, which had to go to sea in undesirable localities, and he was cruising in command of an old wooden steam frigate on the

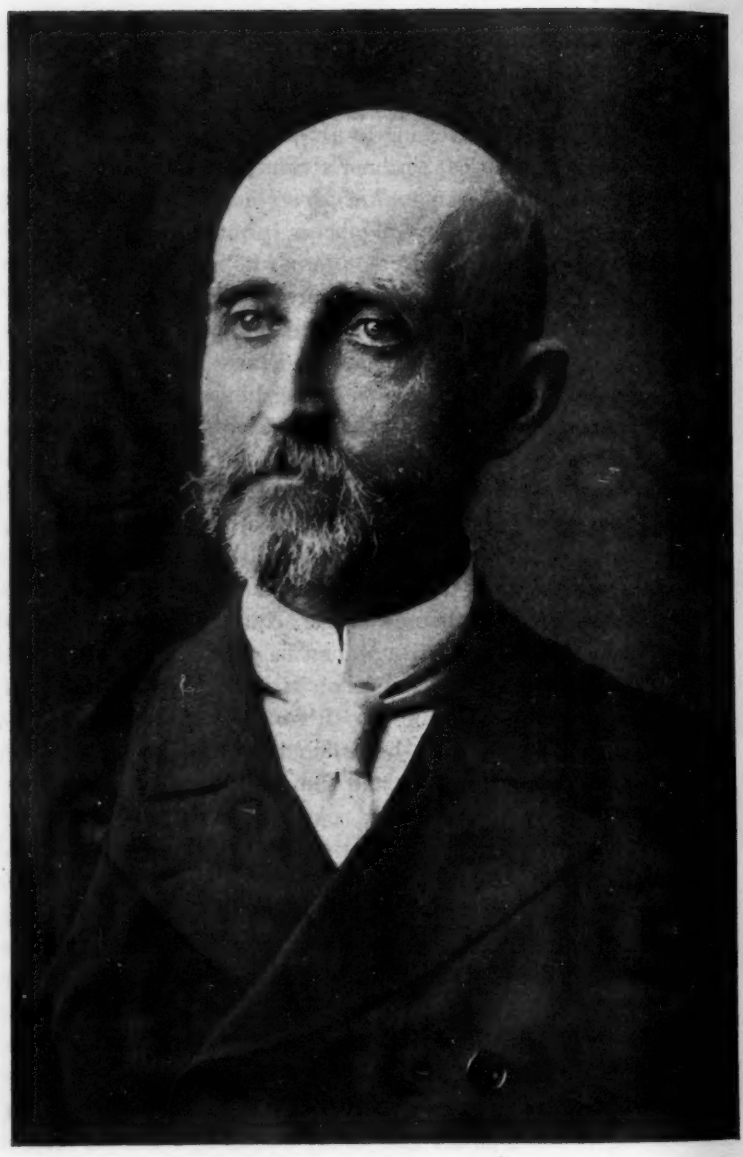
west coast of Central America. Epidemics and insurrections being quiescent, he indulged his bent for the study of history, especially maritime history, and for writing magazine articles and essays.

At that time our Civil War had gone far enough into perspective to become historically interesting to a new generation, and the well known publishers, Charles Scribner's Sons, started to get out a series of episode volumes upon *The Army and The Navy in The Civil War*. Seeking among naval officers for authors for the latter they turned to Mahan and Professor James R. Soley, the instructor in Naval History at the Naval Academy. Their books came out at the very time Luce was scanning the navy lists for possible instructors, or rather, lecturers, for the War College, and while Mahan's literary tendencies were marking him in the eyes of the navy powers-that-were as a crank and a highbrow of practical professional incompetence, it marked him for Luce as one of the men he wanted, especially as it confirmed Luce's calibration of him when they were together as instructors at the Naval Academy, Newport, R. I., in the beginning of the Civil War.

So, with Mahan and Soley almost contemptuously assigned to him as an academic staff, the new war machine of which Luce was the main crank began to turn. Mahan began to prepare and deliver his splendid series of lectures on strategy and tactics which have since been published under the title of *Naval Strategy*. Officers permitted themselves to be ordered to the College for instruction, some out of curiosity and some because Newport was a nice place to spend the summer. As McCarty Little, another crank who soon after helped to turn this great engine, used to paraphrase it: "They came to scoff, but many remained to pray."

The greatest single product at that time, and for all time, of Luce's school of instruction in the art of war did not come from the classes under instruction but from the staff itself in the person of Luce's coordinate crank, Mahan. He now had the opportunity and incentive for that analytical and comparative historical research which had always been his hobby, and side by side with his instructive lectures he wrote that wonderful book which gave a new meaning to naval power and finally awoke us from the torpor of our naval holiday: *The Influence of Sea Power upon History*.

It was my good fortune to serve with Captain Mahan a few years after the publication of this book and just after he had



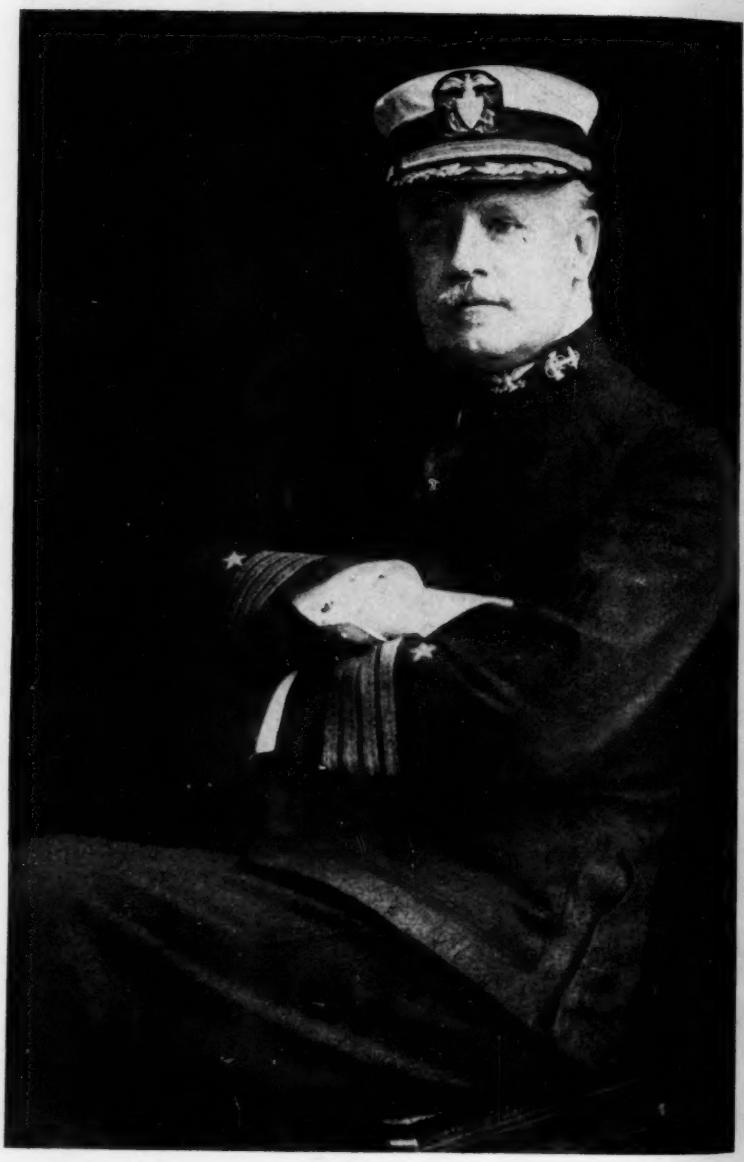
CAPTAIN A. T. MAHAN, U. S. N.

completed his second term as president of the War College, when he was in command of the flagship of the European Station. Tall and spare; courteous, yet always aloof; uninterested in the interior details of ship keeping and crew drilling, and always intensive and scholarly in his conversation, I could readily understand how he could be looked upon by the average naval officer of that day as a crank. Our ship was much in England in those days in order to permit the British to bestow upon Mahan the boundless entertainment and honors which his great book had evoked, and, of course, all officers attached to his ship participated in these, but never did I see him in the least degree emotionally elated, but rather always displaying a dignified shrinking and diffidence.

It was his habit, when the ship was at anchor, to walk up and down the quarter deck with the officer-of-the-deck during the "first dog watch" from four to six P. M. On one of these occasions he told me of his long struggle to find a publisher for *The Influence of Sea Power;* how the Navy Department refused to consider its publication as an official War College document, and how one after another of the leading American publishers returned it until at last, as I recollect, he reluctantly sent it to England.

During these talks I found that Captain Mahan was obsessed with two strange apprehensions. One was that his ship would some day be cut down in collision with another vessel, and for this he prepared by unusually frequent collision drills, and the other was that our form of government was still experimental and would some day go through another disrupting test of its endurance, either from within or from without, more serious than our Civil War. In connection with the latter obsession an amusing incident occurred one Sunday when we were lying in the harbor of Villefranche in the Mediterranean.

It was at the time of the great labor riots in Chicago during President Cleveland's administration. The news of Mr. Cleveland's call for troops to suppress the riots reached the flagship one Sunday morning by the Paris *Herald.* A few hours later church was "rigged" on the gun deck in the usual man-of-war manner; benches for the crew facing the chaplain's reading-desk and chairs for the officers arranged in a semi-circle behind it. There was an



CAPTAIN WM. MCCARTY LITTLE, U. S. N.

unusually large attendance of both officers and crew, the former including the Admiral and Captain Mahan.

The Chaplain prefaced his sermon by saying he had intended to preach on another subject, but the news of our crisis at home had decided him to make a short address on law and order. At this, Captain Mahan sprang up in alarm and started toward the Chaplain, but was pulled back by the Admiral with an undertone admonition: "Sit down, Mahan. Let him go ahead." This, and one or two subsequent impulses of Mahan, were unseen by the Chaplain as they took place behind him and he concluded what proved to be quite a harmless address. As he was going toward the companionway after the service, however, Captain Mahan intercepted him, saying he wished to see him in the cabin.

After removing his vestments the Chaplain went to the cabin and found Mahan pacing it in much excitment. A heated colloquy ensued during which the Captain charged the Chaplain with not confining himself to preaching the Gospel, and preaching upon dangerous political topics, and ended by ordering him to submit his sermons to the Captain on Saturdays for revision. The Chaplain protested that he could not do so because his sermon was a matter between himself and his God, and he afterward made a written report to the Admiral of the interview and the stand he took in the matter. This report was referred to Mahan, who endorsed it with his version and views.

Admiral E—— was a bluff and hearty old sea-dog to whom such a controversy was extremely distressing, but he was a resourceful old gentleman with a keen sense of humor. After tugging at his white, spiky side-whiskers for some time and frowning at the correspondence, he broke into a deep, hearty laugh and made upon it the following endorsement:

"As Chaplain S———— claims this to be a matter between himself and his God, I do not feel that I have sufficient authority to adjudicate it. I therefore refer it to the Navy Department."

Captain Mahan was a skillful and confident pilot and a fearless navigator, but his fear of collision when another vessel hove in sight was curious. Finally the dreaded catastrophe came. We were anchored in the River Scheldt, in its sharp bend below Antwerp, when, very early one morning, a deeply laden British collier coming down the river around the bend became unmanage-

able in the current and rammed us near the starboard bow, cutting us open to a point some feet below water. Captain Mahan was in his cabin taking his morning bath and rushed on deck clad in little more than a short smoking jacket. Happily our officer-of-the-deck, a Danish lieutenant who had been through a hard school of emergency work on Danish sailing ships and who had been assigned to us as an auxiliary officer for instruction at the request of the Danish Government, was equal to the emergency. He had foreseen the inevitable collision the moment the unmanageable collier appeared, and, with our crew letter perfect in collision drill, he and they had acted so promptly that our collision mat was dropped over the hole as the collier backed out and we were quickly out of danger. Nevertheless, one of Mahan's two apprehensions was realized. Will the other one ever be? And if so, will we be prepared then through his teaching and foresight, as his ship's crew was in that collision?

The vicissitudes of the War College in its early days and the struggle of its intrepid founders to keep it going in the face of hostility, scorn and ridicule on the part of the officials in Washington and even throughout the service; the attempts to abolish it, or to merge it with the Torpedo School or Training Station, and the attempts to starve it out by refusing it officers for its classes or its staff and appropriations for its equipment and maintenance cannot be told here, but this story would not be complete without mention of the third and last of the trio of cranks which started the College going; Lieutenant, afterwards Captain (retired), William McCarty Little. He was a "plebe" at the Newport Naval Academy when Luce and Mahan were instructors, but probably at that time attracted little, if any, attention from them. He developed into an officer of theories and fads and crotchets, with such enthusiasm for each of them that he was usually a bore to his messmates; in other words, from the outstart of his career he was regarded as a crank. A long European cruise and subsequent leave in Europe had given him almost a foreign and quite a French mannerism, and, although a large man, his way of wearing a small pointed moustache and imperial, coupled with his mastery of the French language, made him appear decidedly like a Frenchman, but there never was a more ideal American.

A few months before Luce was left with his mess boy and suit-

case on the steps of the poorhouse at Newport, Little met with an accident which ended his active naval career and turned the intense energy and lifelong current of his super-active intellect toward the War College. When out driving one day a stick or stone was knocked up by a wheel or the horse's foot and struck him in one eye, completely destroying its sight, and in spite of all the protest and influence he could bring to bear he was railroaded on to the retired list. Living in Newport, and then well known to Luce, it was not long before the latter recognized in him an ardent disciple and had him attached to the War College staff, and on it he remained with but one short interval the rest of his life, carrying along from president to president, from faculty to faculty, and from class to class, the very incarnation of the indoctrination of the founders until both Luce and Mahan had passed away and he himself passed on to join them. To him no obstacle thrown in the way of college progress was insurmountable. On one occasion he had a problem in fleet tactics which he wanted the fleet, then in Narragansett Bay, to try out, but this was not approved; he then asked for the steam launches from the fleet but they too were denied him, whereupon he proposed to borrow a lot of boat hooks, and assuming their length to be the turning radius of his vessels, to give one to each member of the class, place the members on the parade ground at the proper proportionate distances to represent his ships in formation and put them through the maneuvers, directing them to hook their boat hooks in the ground and walk around at the ends of them where the maneuvers involved changes in direction.

There came at last a time when the potency of Luce's creation was fully and universally recognized; when its opponents had either seen the light or faded into obscurity, and it was my privilege to be present as a member of the War College staff on a day which was typical of the new order of things. The Atlantic Fleet was assembled in the harbor and the splendid library of the new college building was filled with officers from the fleet, high and low; with officials from Washington, civil, naval and military; with distinguished civilians from Newport; with army officers from the forts around the bay, with ex-presidents of the college and with the college staff and class, all standing in reverent silence as a flag was swept aside from a magnificent oil portrait of Rear

Admiral Stephen B. Luce, painted by one of our best artists through almost universal subscriptions; and the original, standing in our midst with Mahan and McCarty Little, said in a choking voice and trembling with embarrassment:

"Words would fail me if I tried to say more than that I thank you from the bottom of my heart."

It was when reading an article by Admiral Luce many years later that I discovered what probably prompted his conversation with Admiral Balch, the superintendent of the Naval Academy, when they passed me on the sidewalk in the Academy grounds, about an officers' school in the art of war. Luce tells in his article how, in command of a monitor in 1865, he was ordered to report to General Sherman at Savannah, after the "March to the Sea," to protect his army in crossing a river in its northerly march along the coast. Sherman then said to him in effect: "You navy fellows have been battering Charleston out of shape for the last three years without making it surrender. Now I'll show you how I will make it fall into your hands like a ripe pear." He then captured Columbia, which cut Charleston's line of communications, and the city promptly surrendered. It was then, Luce said, that he realized that there were fundamental principles of warfare alike on land and sea which the Navy did not seem to know and which could be academically taught. Now Luce and Balch had both been in the North Atlantic Blockading Squadron which did that three years' senseless hammering in front of Charleston, and Luce was, no doubt, expatiating to Balch upon the light he had seen after his conversation with Sherman.

As a postscript I will add the interesting coincidence that when the prospective first president of the War College was cooling his heels in that guard tent on Gardiner's Island, after failing to slip past the sentries into camp, a recent president of the War College, then an ensign and now Rear Admiral (Sims) with the writer and two others, had successfully slipped out of camp and was making a negro caretaker of the Gardiner Mansion do a buck and wing dance in its kitchen for our amusement.

THE RIGID AIRSHIP AND THE WEATHER

By Lieutenant Joseph B. Anderson, U. S. Navy

AT THE PRESENT time the rigid airship is of all aircraft, with the exception, of course, of the free balloon, by far the most dependent upon weather conditions. This is due entirely to its great size and the imperfect methods used in handling it at its base, for once in the air it can take care of itself as well as any plane of like speed and has the advantage that owing to its great fuel capacity it can remain in the air long enough to allow any ordinary period of bad weather to pass by and then seek its landing place; but with the present methods of handling, this ship becomes a real problem when on the landing field or when being taken in or out of the hangar, for here its great size always works to the disadvantage of the handling crew. Of all the maneuvers, the carrying of the ship from the hangar to the field preparatory to flight is the most difficult, so it will be described briefly to point out the major difficulties. If there is no wind blowing at the time chosen, it makes no difference whether the ship is walked out to the field tail first or nose first, nor is there any choice in the end of the hangar to be used, but a flat calm does not often occur, especially in the vicinity of a large hangar, for light winds and gusts will occur there long after they have died out on the open landing field. In case a wind is blowing which has a component parallel to the axis of the hangar, the leeward door is always chosen, since there is then far less danger of the ship being blown against the hangar by any sudden gusts. If the ship is moored in the hangar with its tail toward the leeward door, the operation of taking it to the field is the least difficult, since the tail may be allowed to swing slowly with the wind as it passes out of the door, thus relieving the pressure of the wind on the side of the ship, and when the whole ship is clear of the hangar it will "nose into the wind" and may be held in this position even in strong winds; but if the ship happens to be moored with its nose toward the leeward door, the task becomes more difficult, for then the

ship must be walked clear of the hangar and allowed to swing through an arc of nearly 180° to place its nose into the wind. The difficulties of this maneuver increase with the velocity of the wind and with the increase of the angle between its direction and the axis of the hangar. All winds produce eddies as they flow over and around an airship shed; those which blow directly along its axis have down eddies which turn back near the ground and blow directly into the open door. Those which cross the hangar at an angle of about 30° to 45° to the axis produce a variety of eddies, the most important ones being in the shape of an "S," the wind coming over the windward corner of the leeward door for a distance of 100 yards, more or less, depending upon the strength of the wind, where it turns sharply downward; at about half the height of the hangar, it turns back toward the leeward corner of the leeward door and near this corner is caught by the wind from the other side of the hangar and carried on across the field. This "S" current is not steady; it entirely disappears at times and confused eddies result; then it reappears, but may be of considerably different proportions. As the general wind becomes more nearly normal to the hangar, gusts directly across the door occur. The strength of the gusts in the immediate vicinity of a hangar is frequently ten to twenty per cent higher than the wind on the field and sometimes may exceed twenty-five per cent. Since a fifteen m.p.h. wind blowing directly against the side of a ship the size of the U.S.S. *Shenandoah* amounts to a force of about 15,000 to 18,000 pounds and the velocity of the gusts may change from eight or ten m.p.h. to fifteen m.p.h., or more, in one or two seconds, it becomes nearly impossible to hold the ship broadside to such a wind. Especially is this true near the hangar door where there are strong vertical eddies. This is the most dangerous condition met in handling these ships. These facts, combined with the frequent observation of 300 men taking the ship to and from the hangar, will convince the most doubtful of the danger connected with these operations. Taking the ship into the hangar is quite similar to taking the ship out "tail first," but is not considered quite so difficult. Those planning for a flight, therefore, must take into consideration the wind conditions at the hangar, both at the beginning and end of the flight, a period covering from a few hours to two or three days.

The handling of the ship on the field also presents numerous problems although not so difficult as the ones mentioned above. Here, too, the strength of the wind is the most important factor. As long as the ship can be held with its nose pointing into the wind, it can readily be controlled, but as the velocity increases the gustiness usually does also, and these gusts, because of their nature, cause continual surgings. Each wind appears to have its own characteristic gusts which continue as long as the particular barometric gradient remains over the given district, each gust causing a change both in direction and velocity, which in a "gusty wind" may cause changes of 20° to 40° in direction and thirty per cent to fifty per cent, or more, in velocity. During these gusts the greatest increases in velocity are not equally distributed between the veering and backing in direction, but, for a given wind, show a preference for one or the other; in other words, while sharp veering and backing occur in rapid succession, the most marked increases in velocity occur practically always with the same change in direction. This character of the gusts can be determined and used to advantage by those handling the airship, but the characteristics which prevail at one time may be reversed on another day.

During flight the rigid airship is concerned with only the worst types of weather, such as thunderstorms and hailstorms, and even these, if local, can be avoided. The ordinary cloudy weather with rain and snow is little more than an inconvenience which can usually be avoided, if desirable, by rising to 5,000 or 6,000 feet and leaving it below. This type of ship is also less concerned with fog than the airplane, since it can reduce speed and seek its base slowly, or await clearing weather. Even surface ships are generally more interested in fog than rigids since the latter can usually rise above the fog into clear atmosphere from which it is nearly always possible to find patches of light fog or even clear spaces and through them to determine the ship's position. In case of necessity the big aircraft can seek its base slowly by means of radio compass, searchlights and sirens. The rigid is subject to the full force of the wind in which it is flying. If its maximum speed is seventy m.p.h., it will stand over the ground if headed west when the wind is blowing at that speed from the west. Winds of seventy m.p.h. are rather unusual at the ordinary flying levels of these ships,

1,000 to 6,000 feet, but they do occur, and sometimes may be considerably stronger, especially during the winter months in the northern part of the United States. If heading the opposite direction the speed over the ground would be the sum of the velocities. Exceptionally strong winds do not ordinarily cover any great extent of territory, nor do they usually last for a long period of time. Because of these facts and the large cruising radius of these ships, it is usually possible to avoid, or to fly out of, the areas so affected when the winds would be adverse and to seek them and gain their advantage when they would be an aid.

The fact that at present there is only one station in America at which a rigid airship can land and be taken care of properly (the Army Air Service at Scott Field near St. Louis has a hangar which can accommodate a rigid airship, but is not ordinarily prepared to land and care for such a ship) presents a serious problem, for once having left the home station, the ship must return to it at the end of the flight. Because of its great cruising radius, long trips are planned, always allowing for a large excess of fuel for emergency in case the ship cannot land at the time planned, but even this reserve may not be too much if adverse weather conditions are encountered, as may be recalled in the case of the *R-34* on its trip to America from England in 1919 when strong head winds caused the use of an unexpected amount of fuel and the ship landed at Long Island with less than one hour's supply of gasoline in its tanks. In England and Germany there were several stations where landings could be made in case of necessity and advantage of this fact was frequently taken. It may be recalled that the *R-38*, on its last and ill-fated trip, was expected to land at Pulham, but owing to the lowness of the clouds at that station it returned to Howden where the conditions were more favorable. With several landing fields along the Atlantic coast prepared to receive these ships, the planning of flights would become much simplified, since weather conditions generally improve along the middle and northern Atlantic coasts at different times and it would, therefore, always be possible for the ship to fly to the most favorable location and await clearing weather and decreasing winds. The importance of a larger number of landing fields becomes clear when it is remembered that gasoline engines are only machines and are subject to breakdowns. The reduction

of the speed following depends on the number of engines which fail and the condition of those remaining. On the return journey of the *R-34* to England two engines failed in mid-ocean and the third was out of commission when the ship reached its base. On that trip the *R-34* had following winds all the way, which materially aided the ship in reaching its base, but had these engine failures occurred on the way to America the trip would have had to be abandoned, since for one period of six hours, with all engines running, it could make no headway over the earth because of strong westerly winds. The staying qualities of the ship allowed it to outlast the period of bad weather and to reach its objective, although, as stated before, with less than an hour's supply of fuel.

It is apparently out of the question to establish many stations similar to Lakehurst, so it is necessary to find other means of caring for the rigid airship. It is fully believed that mooring masts are the answer to this problem, since their erection is neither costly nor difficult and large handling crews are not necessary. A few men on the ground and at the mast have secured the *R-34* to a mooring mast in winds of gale force and released it for flight under the same conditions, while it is stated that the same ship rode easily at the mast in winds of over sixty m.p.h. On the night that the *Shenandoah* was blown from the mast at Lakehurst, the official anemometer had been recording gusts of sixty-two and sixty-four m.p.h. for twenty minutes before the sixty nine-mile gust which tore the ship free. Frequent checks with the air speed meter in the ship's control car during the afternoon showed that the wind at the top of the mast, 175 feet above the ground, was averaging about twelve per cent higher than at the station anemometer, which is about seventy feet above the ground. This shows that the ship successfully rode gusts of seventy-two m.p.h. and did not break away until a wind of over seventy-five m.p.h. hit it. The erection of mooring masts at cities throughout the United States, without doubt, would make the future operation of rigid airships far more practicable and simple; but even after numerous masts have been established, the airship will still be subject to adverse weather conditions, such as gales and thunderstorms, and the captain who knows what conditions exist over the proposed route and what changes will occur during the coming twenty-four to thirty-six hours will have a distinct advantage over the one who considers

his ship independent of the weather. Moreover, general overhauling and major repairs of the ships will nearly always take place in hangars, so the problems connected with taking them to and from the hangar will continue to trouble the operating crews at these stations.

At the present time, and doubtless for a long time to come, the efficient operation of rigid airships will depend upon the forecasting of weather changes and taking advantage of favorable conditions and avoiding the dangerous. These forecasts must be obtained from a weather forecaster who is familiar with the requirements of a flying weather forecast and has had experience in foreseeing the weather conditions that have a peculiar importance to flying. The forecasts must be considerably more in detail than those ordinarily issued for agricultural and commercial purposes and can best be obtained for short flights from the meteorologist at the air station, and in the case of long flights, by a forecaster on board the ship itself. To illustrate the above statements it will suffice to take an example as follows: It is desired to make a short flight of several hours in the vicinity of the station for some test, or training flight, but it is not desirable to be caught in a thunderstorm. For ordinary commercial and agricultural interests it is sufficient to say for tomorrow's forecast, "thunderstorms," but at the air station it is desired to know what time of day they will occur, and generally the forecaster at the station can give this information, at least to the extent that he can tell whether or not it is safe to attempt the flight on the day in question, for not only has he the same map as a forecaster at a distance, but he has also the sky, his instruments and a knowledge of the local peculiarities in the district concerned to aid him in deciding at what time such storms are most likely to form. Even after heavy clouds begin to appear on the horizon it is not always necessary for the ship to return, for several such storms may pass within sight of the station before the station itself is threatened. By having someone on the station whose duty it is to watch and study the weather the maximum amount of flying can be done with the minimum amount of risk, for he becomes accustomed to the local peculiarities and has time to watch the formation and drift of all storms in the vicinity. For long flights the captain of the ship wants to know when the ship can leave the hangar, what conditions he will en-

counter at various stages of the flight and at various altitudes, what the conditions will be on his way home and that he will be able to land the ship and put it away safely at that time. To supply all this information it is necessary for the meteorologist to become thoroughly familiar with the local peculiarities through the study of past records which must be as complete and for as long a period as possible; moreover, he must constantly study the current and past weather over the whole country by means of the daily weather map and climatological data, for it is only by means of the former that definite local forecasts can be issued and by the latter that forecasts over wide areas and for periods of twenty-four to forty-eight hours can be made.

It is well known that the weather map is the basis of all general forecasts and at present there is no other instrument which is likely to displace it. It is made from the simultaneous observations at U. S. Weather Bureau offices throughout the United States. Each station reports the temperature, barometric pressure, wind direction and velocity, state of the present weather, precipitation during the past twelve or twenty-four hours, thunderstorms and occasionally a few more features. Shortly after these observations are made, they are placed in code and put on the telegraph wires; then each station begins to receive the observations from other points. As soon as these arrive they must be decoded, the figures placed on special maps and isobaric and isothermal lines drawn. While this will suffice for some forecasters, others elaborate by drawing many additional lines on the map. The receiving, decoding and drawing can generally be accomplished in about one and one-half hours, so since the observations are made at 8:00 A. M. and 8:00 P. M., 75th meridian time, the maps are ready for the forecaster's study by 9:30 o'clock. The more detailed the maps, that is, the greater the number of reporting stations and the more detailed information from each, the more accurate the forecaster can be, both in time and weather detail. Maps have been classified according to the shape of the isobars into seven types, cyclone, anticyclone, secondary, V-isobar, wedge, col and straight, and in the early days of aviation attempts were made to use this classification as a basis for determining weather suitable for airships according to the following scheme: cyclone, secondary and V, unfavorable; anticyclone and wedge, favorable; col and straight, doubtful. This classifica-

tion served a useful purpose at the time but has long since been abandoned, for large areas of anticyclones are frequently unfavorable and much favorable flying weather may occur well within the area of a cyclone of moderate intensity. The real determination of the favorableness of the weather can only be made from a map with many details. This is best shown by attempting to forecast from a map drawn from the complete 8:00 o'clock reports and then trying to forecast from a map drawn from the modification of the same reports broadcasted from Arlington at 10:30, these latter reports leaving out entirely many of the reporting stations as well as parts of the observations from the stations transmitted. Just as neat anticyclones and cyclones can be drawn but the lines are not as accurate nor are all the details present, so the forecaster must be more general in his statements. The Arlington map is a wonderful help when it alone is obtainable, but it must always remain a poor second to the complete report.

After the map has been drawn and the details studied, the principle that "weather moves," generally in an easterly direction, is applied and forecasts for desired districts are issued. To facilitate this feature of the morning's work, maps for many years past have been studied and the average movement of highs and lows found. To those whose duties have not required regular daily forecasting, it seems perfectly simple, when reading some of the older meteorological literature, that if one map be furnished, a satisfactory forecast for the next day can be issued. This method of forecasting is about as follows; having found a well developed low, and noting in the table of average velocities that it should move 750 miles in a northeasterly direction in the next twenty-four hours, imagine the center 750 miles northeast of its present position and assign to all the territory covered the characteristic weather of an ideal cyclone and issue the forecast accordingly; but a little experience will show this idea to be entirely incorrect, for all lows and highs do not move at the average rate; they sometimes stand still for twelve, twenty-four or thirty-six hours and then assume their normal rate, or they may race across the country at a rate at least fifty per cent greater than the average. Cyclonic storms also change in size and intensity from day to day, so while their rate of movement may be normal, yet because their area is changing, their characteristic weather and winds may be advanc-

ing at a far different rate. As airship stations need forecasts definite in detail and time, it is evident that forecasts made from generalizations alone are unsatisfactory. The only way to determine what weather a certain pressure area will give is to know its history as well as the history of the surrounding pressure distribution, and this can be gained only by studying it from day to day; but even the past history is not sufficient, for as new supplies of air are drawn into its circulation, its size, energy and frequently its shape may change very materially, so every changing tendency must be noted and watched. Because of the rapidity of many of the changes, maps twenty-four hours apart are not frequent enough, so the morning and evening maps become necessary. For most occasions the twelve-hour maps enable the forecaster to watch the changing and advancing conditions in such a manner that accurate and timely forecasts can be issued. On some occasions, however, it would be a distinct advantage to have maps drawn from six-hour observations. Two such instances occurred during the fall of 1923, the first one on October 30 when the 8:00 A. M. and 8:00 P. M. maps showed conditions improving over the northern United States, and gave promise of fair weather and moderate winds over the north Atlantic coast for the next day, but during the early morning of October 31 fresh winds developed and the 8:00 A. M. map showed a small depression forming over Lake Ontario, which later developed into an energetic low and passed out of the St. Lawrence valley, causing fresh and strong winds with cloudy and rainy weather over the whole northeastern United States. Had a number of airships been in the air at that time it is conceivable that they would have experienced considerable difficulty in reaching their base on account of the strength of the upper winds. A midnight map would have given ample warning. The second example occurred on the night of November 12, when a storm in the south Atlantic pushed west to the Middle Atlantic coast and caused the winds to rise, between midnight and sunrise, from less than ten m.p.h. to gusts of thirty-six m.p.h. at the Naval Air Station, Lakehurst, N. J., and the stronger over the coast. As these conditions were so different from what had been expected from the 8:00 A. M. map of November 11, and even the 8:00 P. M. map of the same date, it is evident that maps six hours apart would have been a distinct advantage. In England four maps are drawn each day

and at the air stations they are used to the utmost. In the United States more frequent maps along the Middle and North Atlantic coasts during the winter season would be of great benefit in the efficient operation of airships, since the South Atlantic storms frequently extend their influence far up the coast within twelve hours after their existence becomes known, and the northern lows often develop great intensity between the Great Lakes and the mouth of the St. Lawrence, causing strong winds and gales to develop over the northeastern United States within a very few hours.

As the regular observations are not taken until 8:00 A. M. and the transmission of the signals require about an hour, it is impossible for the forecast to be issued until several of the best hours of the day have passed. It thus becomes of prime importance that the signals be received as early and rapidly as possible and that the decoding and map drawing be expedited, for the earlier full information can be gained the more efficient becomes the operation of the station. A good example of the danger which once in a while may arise from having the signals delayed, occurred at Pensacola in March, 1922. The map of the day before showed an active low which was expected to move northeast and give rain and southerly winds that night with rain the next morning, followed by clearing weather in the afternoon and winds shifting to northwesterly, but during the succeeding twenty-four hours this depression took the form of a "V" with a very marked squall line which had passed Mobile, sixty miles distant, at the time of the observation, and reached the air station just as the messenger arrived from Pensacola with the morning signals. The only warning the air station had of the advancing line squall was the characteristic line squall cloud which advanced from the northwest and brought with it squalls of about fifty m.p.h. and exceptionally heavy rain. The cloud gave about forty-five minutes' notice, which happened to be just sufficient to secure the seaplanes.

There is really considerably more to map drawing than the mere placing of isobars through points of equal pressure, for occasionally the easiest method of drawing these lines fails to explain the accompanying weather. It is necessary, therefore, to keep constantly in mind this thought of explaining all the present and past weather on the map. If it is impossible to do so it is

hardly possible to foretell the conditions that are to develop farther along in the life history of the pressure areas. Continued practice, of course, increases the rapidity of drawing them and speed is often an essential feature. Moreover, long familiarity with maps enables a forecaster to visualize the map when only partly completed—this visualization increasing speed in drawing and accuracy in localities where reports are few. Still further, the familiarity with the weather to be expected in the various sections of cyclonic areas must sometimes be used to draw the isobars where there are only a few reports covering a great area. At the time of the trans-Atlantic flight of the *NC-1, NC-3* and *NC-4,* maps were drawn for the whole Atlantic Ocean. To draw these maps reports were available from a line of destroyers extending east and west from Ponta Delgada, two battleships to the north and northwest, one far to the northeast and one far to the southwest. Because of the great distances involved and the positions of the reporting ships, the first maps drawn failed to explain the local weather at the Azores, but after close observation of the sky, winds and barometer, the position of Ponta Delgada in the cyclonic depression was determined and the isobars modified to meet this added information; the resulting map proved to be satisfactory in all respects and the drawing of the succeeding maps less difficult.

Having the complete and accurate map the forecaster has then all that is ordinarily required to issue general forecasts, although it can be made more accurate and definite if he has upper air observations as well. He can forecast the winds and weather for a state 1,000 miles distant and all the intervening territory almost as accurately as for his own state, but the forecast must, necessarily, be more general, since he is not as familiar with the local modifications which occur owing to topography, etc., nor does he have the information to be gained from the appearance of the sky and clouds and character of the winds. For long flights these forecasts are of great value and quite satisfactory, providing settled weather occurs, but when it is unsettled and stormy more detailed information than the general forecast contains is desired by the airship captain.

The term local forecasting is generally used to indicate that the forecast has been issued from local information only, such as the

records of the local instruments, the sky, clouds and winds. There are some people who are "weather wise" and some who can "feel" the changes without knowing well why they expect them. A more important person to airships is the one who has long observed clouds and the sky and studied them in connection with the past, present and following weather, for his opinion, being based on sound principles, can be accepted with confidence for a period of a few hours and under some conditions for a whole day or more; but those who are really expert in cloud and sky prognostics are rare and they become so only after years of close observation. Those who have studied the weather intently for a whole year know well the differences between summer and winter cloud forms, also the forms which occur in front of an advancing cyclone and those in its rear. Even this much is valuable while flying, but much more is to be desired. For instance, on a summer day cumulus clouds begin to form during the morning, so the natural question is, will thunderstorms develop? By recalling the type of the sky the day before, the character of the night, the present conditions and the appearance of the forming clouds, the answer can very often be given. Equally important and difficult is the proper reading of the high or cirrus clouds, where certain types are the forerunners of cyclonic storms of great intensity, others precede moderate disturbances and by their form and appearance show that the atmosphere is not violently disturbed, and still others show a stable atmosphere which can produce nothing but fair weather. The intermediate clouds, the alto-cumulus and alto-stratus, also are important in local prognostics but frequently do not receive the attention they deserve as forerunners of weather changes, especially in connection with thunderstorms in summer. For local forecasts covering periods of several hours no clouds can be ignored, but to be of value all peculiar or marked changes in their appearance and behavior must be noted and the cause discovered. A very few timely warnings by the station weather man which may save life and property will justify his constant study of the sky. Two examples of this type of forecasts will prove their value. During 1920 non-rigid airships were used constantly at Pensacola, Fla., for training new pilots. On one day the weather map showed no unusual conditions; in fact, the indications were for fair weather with the usual summer cloudiness with gentle

to moderate southwest winds. It was customary for the ships to leave the station at the noon hour for a two-hour flight while all of the ground crew went to dinner, during which time there were not enough men at the landing field to handle a ship in case the wind increased and it was forced to land. On the day in question the first ship had left for the noon-hour flight and the second was about to leave with the aerological officer as the officer to be trained. While awaiting the final preparations, he noticed a peculiar turbulence in a small cumulus cloud in the northwest and called the attention of the flight officer to it with the request that the flight be postponed at least ten minutes to see what the condition meant. As this cloud was watched it was observed to be growing both toward the northeast and southwest, that its center was thickening and that it was taking on the appearance of a roll, with whisps of cloud forming under it and rising into its base. A few minutes more showed similar clouds forming along the line in which the original cloud was spreading and it could then be seen that the cloud was moving toward the southeast. The flight officer was then advised to call off the flight, secure the ship and hold the crew on the field for the other ship. By the time the ship was secured in the hangar a definite squall line cloud had formed, extending from the northeastern horizon to a point west of the station and rapidly extending itself toward the southwest, the whole cloud advancing broadside from the northwest. The first ship did not notice, or recognize, this cloud until it was well formed, then it turned and raced for the station at full speed, arriving there just in time to be safely housed by the crew which had been held on the field for its coming. The other instance is one in which the color of the sky was the only sign of impending trouble. It occurred at Pensacola one Sunday noon just as an *F-5-L* was being taken from the hangar to go in search of a missing civilian plane which had left New Orleans some six or seven hours before. The aerological officer was asked about the suitability of the weather for the proposed flight, and had gone to the observatory to examine the instruments and get a good view of the sky, for no map had been received that day. The instruments and clouds (the ordinary summer cumuli which occasionally develop a shower) indicated no marked change in the weather, but a peculiar greenish-yellow light was noticed when looking toward the sun, so he advised a

delay to see if it could be determined what was causing this oddly colored sky and upon his advice the plane was left on the concrete between the hangars. The color deepened and within fifteen minutes the answer was apparent, for the sky had become murky, then gray and finally black and a thunderstorm with marked lightning and thunder developed directly over the station, during which the wind increased to between thirty-five and forty m.p.h. and within a ten-minute period had blown from every direction on the compass. The storm, then well formed and growing in extent, moved off toward the southwest, carrying with it heavy lightning and thunder and exceptionally heavy rain. During the progress of the storm a telephone message stated that the civilian plane was safe at Biloxi, Miss.

By using the weather map for the general forecasts and modifying these forecasts in accordance with the local indications, forecasts most suitable for airships are obtained. Frequently both types of forecasts call for the same type of weather and then the forecaster is most confident; sometimes the local modifies the general to the extent that flights may be advised, providing they are of short duration, where the general forecast would have been unfavorable, or cancelled when the local conditions show threatening or dangerous weather to be closer than the map would indicate. During the recruiting trip of the *NC-4* a good example of the former occurred when the plane was to leave Vicksburg, Miss., and fly to Natchez. The flight to Natchez was scheduled for December 8, 1919, but a trough of low pressure covered the Mississippi valley and was causing rains and foggy weather throughout that district, hence the flight was postponed. The map on December 9 showed that the depression had made little progress and that the bad weather would continue throughout the day. The sky at Vicksburg was only partly cloudy with low, fast-moving, ragged-edged cumuli from the south, cirro-stratus from the southwest, and a surface wind from the east. All appearances, as well as the map, indicated a bad day, yet with Natchez only an hour and a half away it was decided that the flight could be made in good weather and perfect safety. Natchez was reached about 10:30, as was expected, and by 11:30 heavy rain with some thunder and lightning and squally winds occurred. At Pensacola the seaplanes are sometimes allowed to do regular flying with storm warnings

displayed along the Florida coast when the local conditions show that the winds will not develop storm velocity for some hours to come, but with a more or less fair weather map flying is quite often suspended when the local signs show thunderstorms developing in the near vicinity.

Because of the importance of the weather in aviation practically all flying fields of both America and Europe maintain a meteorological office and meteorological personnel. In England it was a fairly standard policy to have a meteorologist in the airship's regular complement on all flights of long duration and on many short flights, especially if conditions were unsettled or the flight was of such a nature that they wished to be unusually careful. For instance, when the *R-38* flew from Pulham to Howden, its second flight, although the distance was short and the conditions quite settled, the Pulham meteorologist was aboard and received the 1:00 A. M. weather reports, drew the map and issued his forecast. Those in the British airship service put much emphasis on complete and frequent weather maps and forecasts and constantly sought the advice of the meteorologist concerning appearances of the sky. Major Scott, who in 1919 successfully piloted the *R-34* to America and back, is reported to have said that he would not make a long flight without a meteorologist and it is known that on all his long flights he had one, usually Captain Guy Harris. Several instances occurred during the flight of the *R-34* where the presence of Captain Harris proved of great value. The most interesting case arose while they were testing the endurance of the ship for its trans-Atlantic flight. It left East Fortune for a long flight over the North Sea and into southern Germany. After passing from the North Sea to the continent, because of "interference," no radio messages could be received and during the ensuing day no weather maps could be drawn. Captain Harris became suspicious of the weather and spent several hours on top of the ship watching some cirrus ventosus (windy cirrus, a type which appears in advance of many energetic cyclonic disturbances) but, because of the motion of the ship, he had difficulty in determining their direction and rate of motion. Finally, however, he was able to see they were moving quite rapidly from the southwest, thus indicating the approach of a low from the Atlantic. He went to Major Scott and told him of the observations made and that he

thought they had better start home immediately. Major Scott reminded him that they were expected to fly over several of the cities in south Germany, but added that he would turn north if it were considered necessary. Captain Harris strongly advised it, so the homeward journey was begun and the North Sea was reached over Denmark where a British warship was at anchor. The warship signalled, by means of lights, that the air ministry had been trying to reach the *R-34* by radio for the past twelve hours, ordering its immediate return because of approaching gales. The ship proceeded to East Fortune at full speed, arriving there in the early evening and was secured in the hangar. By midnight the predicted gales were sweeping the whole northern part of England and continued to do so for the next two or three days. Again, on the trip to America the *R-34* had difficulty in the receipt of weather reports, so Captain Harris had to resort to his knowledge of clouds. When about over the mid-Atlantic he again saw the characteristic cirrus ventosus and reported to Major Scott that a cyclonic storm was advancing from that direction. Several hours later a radio message from the air ministry, where complete maps had been drawn, confirmed his conclusions, only modifying them to the extent that it was a secondary forming instead of a primary depression. It was this secondary which caused the ship to stand still for six hours although the engines were driving it through the air at fifty-five m.p.h. The ship was at about 6,000 feet and well above the rain and heavy clouds. Passing over the Bay of Fundy thunderstorm conditions were encountered, where again Captain Harris's knowledge of clouds was a great aid in avoiding the storms and still making the best progress toward New York. On several occasions he was able, from his maps, to advise a change in altitude to gain the benefit of more favorable winds.

By having meteorological personnel in the ships, especially during flights, the captains have with them persons who are familiar with weather schedules of the radio broadcasting stations, the codes used, as well as the codes used by ships at sea; they are familiar with map drawing, and are able to decode the messages and complete the map in a minimum of time. Their experience with past maps gives them a marked advantage in diagnosing the maps and forming their conclusions, all of which enables the captain to obtain a detailed general forecast for any area he desires in

the shortest possible time Moreover, it is fair to assume the meteorologists aboard will be more familiar with cloud forms and their meanings than the average person, so their advice based upon these "signs" will often prove of great benefit, especially in the event of the failure or delay of the broadcasted signals (in the summer time, thunderstorm conditions frequently make it impossible to receive the Arlington messages) and also they will often know the manner in which the general forecast should be modified and advise the captain accordingly. One point further should be added, namely, all clouds look considerably different when flying near them and often cause those who are quite familiar with their appearance from the ground to ponder for some time to determine the condition they represent. Since it appears quite possible that occasions will arise in the future, as they have in the past, when the proper interpretation of cloud forms may mean the safety of a ship and its crew, it seems that it would be a wise policy if meteorological personnel were included in the complement during all flights so that every opportunity would be afforded for them to become thoroughly familiar with the appearance of the clouds under all the varying conditions met during flying.

THREE FUNCTIONS AND THREE NEEDS OF THE NAVAL RESERVE

By Lieutenant (j. g.) Sampson Scott, U. S. N. R. F.

THE personnel problem, always an important one, is today of greater importance than it ever has been before due to the Limitation of Armament Treaty and to the curtailment of appropriations. In considering the personnel situation, one must consider the condition of the Naval Reserve and it therefore behooves all of us, regulars and reservists alike, to look carefully into this important factor of our first line of defense.

After graduating from the Academy, the writer had two years with the fleet, and has subsequently had two years in an active division of the Naval Reserve, and is, therefore, perhaps in the unique position of being able to treat of this subject both from the viewpoint of the regular looking at the reserve and the reserve looking at the regular.

Before proceeding, however, it is essential that every one know the past history of the Naval Reserve so as to be able to consider our present problem from all angles.

The Naval Reserve Force, as at present constituted and administrated under existing laws, consists of a large number of classes divided according to the past experience of the members of these classes and according to their probable duties in the Navy when called into active service in time of war, irrespective to a certain extent of the duties required of these various classes in peace times or of their combination to form homogeneous organizations for purposes of carrying on drills and other exercises in order to maintain efficiency.

A Naval Reserve was first provided in the Act of March 3, 1915, by authorizing a Naval Reserve of two classes, to be composed of men discharged from the Navy and assigned to classes according to length of time intervening between service in the Navy and the Naval Reserve. The first class received from $30 to $120 annually and was required to keep clothing on hand; the second class $12 annually, and when called into active service was allowed an outfit of clothing not exceeding $30 in value. This law provided that members of the Naval Reserve might, in time of peace, be required to perform not less than one month's active service on board a

vessel of the Navy during each year of service, but not to exceed two months in any one year. These men were not obligated to perform any drills. An inappreciable number of men joined and thereby very little of the $130,000 appropriated was consumed.

The act first referred to (March 3, 1915) was supplemented and enlarged by the Act of August 29, 1916, by which the present Naval Reserve Force was brought into being by providing for a body of officers and men in various classes, six in number, who obligated themselves to serve the Navy in time of war or during the existence of a national emergency. Annual retainer pay after confirmation was provided for officers and men but they were not required to drill or take training other than active service. If a reservist failed to perform three months' active service in an enrollment, he received during the next enrollment $12 per year retainer pay until such time as he completed three months' active service.

The Act stated that in consideration of the members receiving retainer pay they were obligated to serve in the Navy in time of war or national emergency, and evidently the idea uppermost in the minds of those who prepared this legislation was to provide an adequate force to meet an emergency then threatening. This same act federalized the Naval Militia as National Naval Volunteers, thus providing for a force for use in an emergency requiring the use of forces afloat in addition to those of the regular Navy. Retainer pay was provided for the performance of drills or equivalent duty.

Under this act neither the Naval Militia (National Naval Volunteers), nor the Naval Reserve functioned as peace-time organizations before being called into active service in the Navy for the war.

Coincident with passage of this act, the Act of June 3, 1916, making provision for the national defense, was enacted, and it is only referred to for the reason that it did for the National Guard what the Act of August 29 did for the Naval Militia by providing pay for drills.

Prior to this time it must be remembered that members of no organizations had been paid for attendance at drills. It had, however, been discussed and considered for several years, because of a change of conditions of training and administration due to coming more under Federal control and supervision.

One of the important things in the minds of those who proposed this legislation was the evident intent of securing an adequate reserve for the Navy, utilizing the experience gained from results attained by Naval Militia in belonging to and drilling in active units.

After entry into active service with the Navy during the World War it soon became apparent that the administration of the Navy, National Naval Volunteers and Naval Reserve Force would be greatly facilitated by amalgamation and, in addition, it became necessary to correct certain faults which had materialized as a result of the Act of August 29, 1916, but these faults to be corrected had appeared in time of war and the Naval Reserve had not yet functioned as a peace-time organization.

Accordingly the Act of July 1, 1918, was passed whereby the National

Naval Volunteers became a part of the Naval Reserve Force (class 2, the Naval Reserve).

At the conclusion of the war there were 20,705 officers and 277,945 men on the rolls of the Naval Reserve Force. These were released from active duty and an attempt was made to form them into various drilling organizations, but, due to the lack of facilities such as armories, and lack of funds for the purpose of securing armories, etc., and also due to the fact that attendance at drills was not made a prerequisite for the payment of retainer pay, and that following their demobilization, most of the reservists were in a measure satiated with military services, as was the case at that time with the National Guard, satisfactory results were not obtained.

Then, in efforts to remedy the situation certain additional enactments were made from year to year, but while these did help very considerably they also led to varying interpretations as to their real meaning when taken in connection with laws already in existence, and adverse decisions highly detrimental to the reserve have now and again been rendered by those in authority.

In September, 1921, the Department, finding it impossible to carry on the Naval Reserve then in existence under existing laws and with the amount appropriated for that purpose for the fiscal year 1922, disenrolled the entire Naval Reserve Force excepting Class 1 and those of the other classes who voluntarily transferred to Class 6 to avoid disenrollment. A board of experienced officers was called to make a thorough study of the entire Naval Reserve situation and make recommendations as to remedial measures. This board held meetings over a period of several weeks and submitted a very complete report on which the proposed S. 1807 is based; and in its present form this bill has the hearty indorsement of the Naval Reserve as a whole.

In the meantime, pending the enactment of remedial legislation, as contained in S. 1807, it was desired to carry on the Reserve as a going organization so far as possible with those members who had remained in the Reserve by transfer to Class 6 and with such recruits as could be obtained. Sufficient money was appropriated for the fiscal year 1923 to resume activities on a small scale, and the amounts appropriated for the succeeding years permitted continuing Naval Reserve activities in a modest way, but as stated these activities were going forward in the face of discouragements and adverse conditions.

Three of the most important functions of the Naval Reserve are:

(A.) The organizing and training in the fundamentals of a carefully selected group of young men who, in case of a national emergency or in case of war, could be distributed in small numbers to the ships in the fleet and who would know enough so that the ship's organization and the ship's fighting efficiency would not be destroyed in quickly assimilating them;

(B.) The developing and special training of the men in these groups who are of chief petty officer and officer material;

(C.) The division or battalion acting in the various communities as a center or gathering point for all those interested in the Navy and to spread in the community the facts concerning the needs of the Navy.

(A.) The question that naturally arises in one's mind is: "Is it possible to train reserves in the limited time available for training so that they can be assimilated in the fleet in case of war or a national emergency?" Assuming the presence of competent officers who are really interested in their work and assuming the presence of essential equipment such as small boats (whaleboats or cutters); a cruising boat (sub-chaser, eagle boat or destroyer); ordnance material (rifles, machine guns, field pieces, loading machines); and navigational and signal equipment, the answer is emphatically, "Yes." As an example, the Sixth Separate Division of the Naval Militia, New York, U. S. N. R. F., is at the present time ready to go to the fleet and with a little additional "breaking in" can take its place. This is the opinion of quite a few high ranking officers of the regular establishment who have inspected the division.

At the present time this division will hold its own with any regular division aboard ship as far as discipline, uniforms, manual of arms and infantry drill are concerned; but by taking its place is not meant taking its place as a separate division on board ship, but having various groups of the division who have specialized fill up the gaps in certain divisions aboard ship. For instance, the "signal section" of this reserve division has two chief signalmen, a signalman second class, and five seamen striking for signalman, and as they are today they would be a welcome addition on the bridge of any battleship because they can hold their own in semaphore, blinker and flag hoist with men of corresponding rates in the regular Navy. The men of the "ordnance section," although of necessarily limited experience, due to the fact that no naval militia armories are supplied with large guns, are familiar enough with rifles, automatics, machine guns, field pieces, and so on, to be of considerable use in the "armory" of a ship. Some of these men have had experience with guns of the secondary battery and all of them are potential gunners' mates. The "engineering section"

contains two rated men who have been rated up since they joined the division four years ago. Most men in the engineering section have had experience both with turbines on eagleboats and with gas engines on sub-chasers. Of course, some of them are engineers by profession; at any rate they would quickly "find themselves" in the engineering force of a large ship; and so on down the line. In other words, this division has divided the men up into those groups so they can be given special instruction. The men of this division, if ordered to the fleet tomorrow, would be of good use and could be broken in so quickly that the ship's organization and ship's fighting efficiency would not be impaired in assimilating them.

(B.) It is a known fact that the making of chief petty officers and junior commissioned officers is not the work of a day or a week. The phrase, "In time of peace prepare for war," especially applies to the chief petty officer and junior commissioned officer problem. Therefore, the selecting, developing and special training of potential chief petty officers and junior commissioned officers is of the utmost importance. The most logical place for this to be done is in the naval reserve units. It is in this respect that an organized and fairly efficient naval reserve unit can do the most good.

In the average group of sixty or one hundred intelligent young Americans who voluntarily attend "carefully planned" drills weekly, who voluntarily take several week-end cruises during the summer months, and who participate in a two-weeks' training cruise each year during their four-year enrollment, there are bound to be a few who will stand out and who will prove themselves potential petty officer material and who, after four, eight, or twelve years in the Reserve, will make good petty officers, providing, of course, that they have been carefully trained and given special instruction by competent officers. In rating up petty officers and chief petty officers they must measure up to the requirements as set by the regular Navy for their particular ratings, and little or no leniency should be shown in their special branches; of course, a little leniency possibly would have to be shown in a person's general knowledge of the Navy, which knowledge only comes to a man after continued sea service. Petty officers and chief petty officers can, and should, be given special instruction each drill night and possibly one extra night a week with the idea of indoctrinating

them with the correct petty officer and chief petty officer attitude and bringing out all the petty officer and officer-like qualities that are in them. The chief petty officers that are of officer material should be given special instruction, and special courses of instruction, such as a course in navigation, a course in "Regulations, Customs and Military Courtesy," and so on, should be arranged for them. In the Sixth Separate Division, Naval Militia, New York, U. S. N. R. F., there have been developed in the last eight years, six petty officers and one chief petty officer, all of whom are dependable and are capable of efficiently performing their duties. The chief petty officer has officer-like qualifications, is anxious to go up for a commission, has attended the navigation class and, undoubtedly, when he has had a little more experience, will be given a chance to take an examination for ensign.

If more divisions in the Reserve Force were situated in the same way as far as petty officers and chief petty officers are concerned, the regular Navy would have a reserve that could be depended upon "to produce the goods" when needed.

(C.) The apathy displayed toward military and naval matters and the seeming indifference toward national preparedness on the part of the public at large are due to lack of information. The truth of this statement is driven home when it is realized that when a naval officer takes the trouble and time to inform a citizen about the Navy that citizen generally becomes a booster for an efficient "Treaty Navy." Of course, officers of the regular establishment are tied down by their duties and by the regulations to a considerable extent, but why shouldn't the various divisions and battalions of the Naval Reserve Force act in their respective communities as a center or gathering point for all those interested in the Navy and disseminate facts in their respective communities concerning the needs of the Navy?

Of course, the Navy League is supposed to do this, but what has it done? Probably due to lack of organization and lack of frequent meetings it has accomplished very little. As a citizen of New York the writer has only heard of the Navy League twice in the last two years and that was on the last two Navy Days, and then only in the papers on the days in question. When one talks to naval officers of high rank and to prominent citizens interested in the proper development of the Navy, one hears on all sides that

there should be some means and some method of informing the country at large of the needs of the Navy—some way of telling the truth to the people and winning them over to the correct viewpoint as regards the proper maintenance and development of a "Treaty Navy." Why shouldn't the naval reserve units, perhaps guided in a general way by officers of the regular establishment, do this?

The Sixth Separate Division, Naval Militia, New York, U. S. N. R. F., has done a lot toward "winning over" the surrounding communities. First, the men and officers have been taught to preach preparedness to the members of their families and friends. Second, there have been "smokers" arranged about once a month and to these smokers the officers invite the leading citizens of the community and the office holders of the community and show them what work is being done. Such "get-together meetings" are very beneficial and invariably make boosters of every intelligent citizen who is present. Third, on several occasions, high ranking officers in the regular establishment have been invited out to these smokers and have addressed the citizens and members of the division and in this way the citizens get to know the regular Navy better. Fourth, mimeographed circulars are sent out to members of the division and the leading citizens in the community telling about the work the division is doing, the needs of the Navy and how the citizens can help. The effect on this particular community has been very noticeable. In fact, at the annual muster and inspection of the division (the division had, for the second consecutive year, 100 per cent attendance) the Borough President spoke and went on record as favoring a large modern armory for the division and the expansion of the division into a battalion.

Three of the most important needs of the Naval Reserve at the present time are:

(AA.) The passage at the earliest possible moment of the bill that was before the last Congress and which failed to be passed in the last minute rush although it was favorably reported by both committees;

(BB.) Proper realization of the naval reserve problems by those in the regular establishment;

(CC.) The whole hearted cooperation on the part of those in the regular establishment.

(AA.) The bill that almost passed and which it is hoped will

pass in the next session completely reorganizes the Naval Reserve Force and puts it on practically the same basis as the National Guard as a result of the National Defense Act of 1920. This bill remedies the principal objectionable features in existing laws which are as follows:

(a) Past service being a prerequisite to entitle a member to payment for attendance at drills, it is impossible to attract or utilize the very ones that it is imperative to have and the ones who apply to become members: i.e., young men. In this regard the laws are fundamentally wrong, for no organization can survive if prevented from utilizing the young men of the country. Imagine the Navy, the Army, other professions, business (private, partnership, or corporations) being barred from utilizing "young blood." In order to correct this it is necessary to give drill pay, as is done in the National Guard, for drills attended without regard to previous service.

(b) Existing laws require active training afloat before pay can be given for drill attendance; it is desired to require active training afloat, but not to make the penalty for failure to take such training afloat forfeiture of drill pay, which tends to discourage any further training whatever, but to make it discretionary with the Secretary of the Navy, allowing him to use his judgment as to whether the delinquent may have failed to train for good reasons beyond his own control, whether he would be desirable to retain in an active status, or whether he had better be transferred to the inactive class of the Naval Reserve or disenrolled altogether.

(c) Existing laws do not allow subsistence to reservists while performing volunteer duty afloat without pay, thereby discouraging such duty; it is desired to remedy this, giving them what the National Guard receives on similar duty, such as duty on target range.

(d) Existing laws do not provide properly for taking care of those reservists who may be injured while performing active duty for training. It is desired properly to care for all such.

(e) Existing laws do not allow "military leave" to naval reservists who are government employees; it is desired to place them on a parity in this respect with the National Guard.

(f) Existing laws are subject to various interpretations due to their multiplicity and varying provisions. No one knows exactly where he stands.

In short, in properly and economically building up and administrating an efficient Naval Reserve Force, new legislation is required and of such an extensive nature that it seems well to reorganize the whole Naval Reserve Force rather than to attempt to correct existing legislation.

(BB.) Legislation is in the hands of Congress, but there are two things that those in the regular establishment can do that will help tremendously in building up the Naval Reserve. The first

of these is the proper realization of the naval reserve problems on the part of officers in the regular establishment. Hardly a day goes by that something doesn't occur that shows that the officers in the regular establishment who naturally are trained to put duty before everything else and who have the Navy as their profession, fail to realize that those in the Naval Reserve do not, and can not, put duty and the Navy above their business. Of course, naval reservists must take an active tour of training each summer; the officers must pass the required mental and physical examinations; officers and men must attend drills regularly during the winter; paper and routine work must be kept up to date; but all this should be done, and must be done, with the least possible inconvenience to the business connections of the naval reservist.

For instance, every one in the business world knows that the last few days of the month and the first few days of the month are, in the very great majority of businesses, the busiest. The last few days, bookkeepers are balancing their books and mailing out their bills; during the first few days, salesmen are making collections promised on "pay day"; credit managers are getting in money, and so on. Therefore, in arranging summer cruises, this fact should be taken into consideration and, whenever possible, cruises should be arranged so that the men will not be away from their businesses the last few or the first few days in the month. In this way a bigger percentage of men could arrange to take the cruises.

Another instance is the recent examinations held throughout the country for promotion. The mental examinations in one naval district were held during the week and began at 9:00 in the morning, and before the examinations started the reserve officers were informed that it would probably take the entire week. This meant that the officers had to devote the entire week to taking the examinations. No wonder that such a small percentage showed up! One would naturally suppose that only old men who were high up in the business world and could afford to take the time off, and people that had no business connections would take these examinations. If the Naval Reserve depended entirely on such people it could never endure. Requests from various organizations were put in before hand to take the examinations at night, but such requests were not granted. Many officers who did not take the examinations would certainly have taken them if they had been

arranged at night. One examination a night or one on each Saturday afternoon for a month or some other such arrangement would have enabled a greater percentage to take the examinations and would have caused those that did take the examinations to be less inconvenienced and less disgusted. A few weeks after these examinations were held, those that did not take them were informed that they could take them, one each night, if they so desired. Why wasn't this done in the beginning? The physical examinations were handled in a similar manner. The reserve officers to be examined were ordered to report at the navy yard in the middle of the morning. There was one (two at some times) doctor conducting the examinations and the entire thing was long drawn out. The result was that many of the officers lost the entire morning from their buisness. These examinations could undoubtedly have been arranged, and with little or no inconvenience to the navy yard routine, at a time when it would have inconvenienced the naval reserve officers concerned less than it did—a few examinations should have been held at noon and a few examinations should have been held each day after business hours. This would have solved the problem and the officers concerned would not have been as inconvenienced and disgusted as they were. In fairness to the doctor conducting the physical examinations and the officers supervising the mental examinations, it must be said that they, as individuals, saw the great inconvenience that the reserve officers were being subjected to and did everything they could to alleviate the situation; but the trouble was that the method was wrong and the method was wrong because those that devised it apparently failed to realize that the average reserve officer has to work for his living and that he could not take a morning off or a week off at his pleasure.

(CC.) The wholehearted cooperation of those in the regular service is essential. This can and should be manifested in many ways.

First, all officers in the regular establishment should know what the Naval Reserve is, what it is doing, what its limitations are, what its problems are, etc. Nine times out of ten a regular officer shows absolute lack of knowledge of such things. Perhaps there are extenuating circumstances, but the fact remains that it certainly discourages those reserve officers who are devoting their time and money toward building up an efficient reserve to meet

officers of the regular establishment who by their questions show how little they know of and how little they think about the problems of the reserves.

Second, there should be a closer liaison between officers of the regular establishment and those of the reserve. The lack of knowledge and indifference toward the reserve on the part of the regular would automatically be overcome and the misconception of the regular and his duties on the part of the reserve would be "shown up." Why shouldn't commandants of districts arrange one Saturday afternoon and one evening a month when the reserve officers of that district should visit the ships of the fleet that are in port at that time? A great deal toward mutual understanding would be accomplished, training problems worked out, lectures given, and the reserve officers would, in a small way, be kept in closer touch with the fleet and the latest developments. The regular Army does it with its reserve officers and wonders have been accomplished—why shouldn't the Navy?

Third, there should be officers detailed from the regular establishment as instructor-inspectors similar to the plan in use by the National Guard. It is true that in the Third Naval District some officers stationed in and around New York have been detailed (in addition to their other duties) as instructors and inspectors of naval reserve units but this plan has been in force only a year, and "the surface has hardly been scratched." More officers on such duty are needed and these officers should be especially selected because successfully to do this work an officer in such a position must be of a certain temperament. They must be officers that will be more in the capacity of instructors than inspectors—officers that will take a real personal interest in the outfit, not a forced official interest. Chief petty officers on similar duty are needed. Drilling one night a week limits the instruction period so much that the only way the officers in the Sixth Separate Division, New York Naval Militia, U. S. N. R. F., have found time to accomplish anything is by dividing the men into very small groups and having a competent officer or chief petty officer in charge of each group. To do this means that there must be extra officers and extra chief petty officers. Some of these should come from the regular establishment.

Fourth, a premium should be placed on efficiency and attendance.

By that is meant if a certain division is admittedly more efficient and is steadily increasing its size, has a good attendance record, has officers that have passed the required mental and physical examinations, then the Navy Department should hold out as a reward for continued successful work along these lines, a better and bigger cruising vessel, increased allowances, more equipment, etc. In other words, give the officers and men that are on the right track some incentive to make themselves better equipped and better disciplined and consequently better trained to take their places in the first line if the need ever comes.

To sum up, we need an efficient Naval Reserve. To get one the present pending naval reserve legislation must be passed; there must be a better understanding between the regular officers and reserve officers and there must be organized, concerted, consistent and continuous cooperation between the regular establishment and the reserves. When the above are accomplished, a Reserve Force will be in a position to organize and train in the fundamentals a carefully selected group of young men who, in case of national emergency or in case of war, can be distributed in small numbers to the ships in the fleet and who will know enough so that the ship's organization and the ship's fighting efficiency will not be disturbed in assimilating them; to develop and specially train all those in those groups who are of chief petty officer and officer material and to act in the various communities as a center or gathering point for all those interested in the Navy and to spread throughout the community the facts concerning the needs of the Navy.

THE INTERNATIONAL HYDROGRAPHIC BUREAU

By Lieutenant Commander George E. Brandt, U. S. Navy

THIS article is written to acquaint the service with the character, organization and scope of the International Hydrographic Bureau.

Historical.—The idea of international cooperation in the field of hydrography was first advanced by Lieutenant Matthew Fontaine Maury, U. S. Navy, who brought about the Brussels Congress of 1853. "Rarely," says Maury, in his account of this congress, "has there been such a sublime spectacle presented to the scientific world before, all nations agreeing to unite and cooperate in carrying out according to the same plan, one system of philosophical research with regard to the sea. Though they may be enemies in all else, here they are friends."

International conferences have followed from time to time, but it was not until the sitting of the International Marine Conference in Washington, in the year 1889, that a proposal was put forward to establish a "permanent international marine commission." It was decided, however, that such an establishment at that time was not expedient. At the International Congress of Navigation, held at St. Petersburg in 1908, a resolution was passed that it would be advantageous if an international conference of seamen and surveyors could be arranged with the object of introducing uniformity in conventional signs and abbreviations on charts, in drawing up sailing directions, regulations for navigation and the lighting and buoyage of coasts.

By the year 1912, when the International Marine Conference was again held at St. Petersburg, most of the maritime countries of the world had come to realize the advantages to be derived from a permanent international organization and the question occupied considerable time in the conference.

H. S. H., the late Prince Albert I of Monaco and Monsieur Renaud, chief of the French Hydrographic Office, were particularly energetic in advocating a permanent body.

Further action towards the establishment of an international hydrographic bureau was delayed by the World War and it was not until June 24, 1919, when the International Hydrographic Conference met in London, that the question was revived. The subjects brought before this conference were divided into ten sections as follows:

1. Charts
2. Sailing Directions
3. Lists of Lights
4. Notices to Mariners
5. Time Signals, Distance Tables and Other Miscellaneous Hydrographic Publications
6. Tide Tables
7. Surveying Instruments for Use on Land and Sea
8. Time-measuring Instruments
9. Interchange of Publications
10. Establishment of an International Bureau.

Twenty-one sovereign states were represented in this conference. The U. S. delegates were Captain (later Rear Admiral) Edward Simpson, hydrographer of the Navy; Mr. G. W. Littlehales, hydrographic engineer, Navy Department; and Messrs. H. C. Graves and J. T. Watkins, of the Coast and Geodetic Survey.

The delegations at the International Hydrographic Conference were unanimous in their opinion that it was desirable that some form of an international hydrographic bureau should be established. It was obvious, however, that the arrangements for the establishment of such an institution could not be carried out during the proceedings of the conference. Accordingly, a committee of three members of the conference was appointed to take the necessary steps to achieve the desired end. The members of this committee were Monsieur J. Renaud, Rear Admiral Sir John Parry and Rear Admiral E. Simpson.

In order to enable the various associate states to understand the general progress of the work of this committee and the attitude of other states, statements were drawn up monthly and forwarded to those concerned; the first one was issued on November 1, 1919, and they were continued without interruption until May 1, 1921.

In July, 1920, it was considered that matters generally were sufficiently advanced to prepare statutes for the International Hydrographic Bureau and the committee proceeded with this matter. Admiral Simpson found himself unable to attend meetings of the committee. It was, however, most desirable to obtain the advice of a third party who was interested and conversant with the entire subject and Captain Phaff, the senior delegate of the Netherlands, kindly consented to visit London and assist the committee in its deliberations. In October, 1920, Rear Admiral A. P. Niblack, U. S. Navy, succeeded Rear Admiral Simpson on the committee.

Provisional statutes were framed and a considerable correspondence followed with the various states, some of whom brought forward additional or modificatory proposals. Adherence to the general proposals for the establishment of the International Hydrographic Bureau was by May 1, 1921, given by all of the twenty-one states represented at the conference in 1919, except two, Italy and the United States.

On May 16, 1921, the delegations to the International Hydrographic Conference were informed by letter that the election of the directors and the selection of the candidates for the secretaryship of the International Hydrographic Bureau would take place. Fullest instructions concerning every detail of the voting accompanied the letter. June 20 was fixed as the final date for the reception of the voting cards. As a result of this election, the following became the first officers of the bureau: Vice Admiral Sir John Parry, Great Britain; Captain J. M. Phaff, Netherlands, Captain S. H. Muller, Norway, directors, and Commander G. Spicer-Simson, Great Britain, secretary-general.

The first meeting of the directing board was held in Monaco, the seat of the bureau, July 6, 1921.

The United States and Italy joined the bureau in 1922.

Objects.—According to the revised statutes adopted in 1923 by all the associate states, the bureau has as its objects:

(1) To establish a close and permanent association between the hydrographic services of its members.
(2) To coordinate the hydrographic work of these services with a view to rendering navigation easier and safer in all the seas of the world.
(3) To cause the hydrographic offices to adopt the resolutions made by the International Hydrographic Conferences.
(4) To endeavor to obtain uniformity as far as is possible in hydrographic documents.
(5) To encourage the adoption of the best methods of carrying out hydrographic surveys.
(6) To advance the theory and practice of the science of hydrography.

The bureau is a consultative body only, and has no authority whatsoever over the hydrographic offices of the members, which remain entirely independent, with complete liberty and initiative. It shall never deal with any subject which involves questions of international policy.

Work Undertaken by the Bureau.—

(1) The study of documents published by hydrographic offices.
(2) The drawing up and publication of various lists, such as of geographical positions, abbreviations and conventional signs used on charts, etc.

H. S. H. The Late Prince Albert I of Monaco
Patron of Hydrography

(3) The study of methods of hydrographic surveying.
(4) The study of the methods of recruiting and training personnel for surveying vessels and hydrographic offices.
(5) The study of methods employed for the production of the results of surveys for publication.
(6) The study of the construction and use of hydrographic instruments and appliances, the principles of which have been approved by any hydrographic office.
(7) The making of researches on any other subjects which affect hydrography.

In order to make the foregoing studies and researches, the bureau collects all of the latest editions of charts and works published by the hydrographic, and other offices of the members, the collection being kept complete and up to date, copies of all new editions and publications being sent to the bureau as soon as issued.

The bureau gives considered opinion on all questions concerning its work, referred to it by conferences or scientific institutions.

Directing Committee.—The bureau is governed by a directing committee consisting of three members, called directors, one of whom is president. The three directors must be of different nationalities, and at least two of them should have had considerable sea experience and have great knowledge of practical hydrography. They are elected by the international hydrographic conferences which are held as a general rule every five years. Should a vacancy occur during the period between conferences, a special election may be held, the voting cards being filled out by appropriate authorities of the member states.

The personnel of the bureau under the control of the directing committee, consists of the secretary-general, who is elected, and the technical and administrative employees appointed as necessary by the directing committee.

The annual salaries of the directing committee and the secretary-general are paid in Swiss francs gold, as follows:

For each of the three directors	28,200 francs
For the president	4,200 francs
For the secretary-general	21,900 francs

Shares, Finance, and Votes.—Each member shall subscribe two shares of 2,000 francs, and those which own 50,000 tons of shipping or more (Navy and Merchant Marine) shall contribute supplementary shares. This scale determines also the number of votes allocated to each member in the election of directors and secretary-general, and gives the following figures:

	Shares and Votes			Contributions Swiss Francs, Gold
	Fixed	Suppl.	Total	
Argentine	2	2	4	8,000
Belgium	2	2	4	8,000
Brazil	2	2	4	8,000
British Empire	2	15	17	34,000
Chile	2	1	3	6,000
China	2	1	3	6,000
Denmark	2	4	6	12,000
Egypt	2	.	2	4,000
France	2	6	8	16,000
Greece	2	4	6	12,000
Italy	2	5	7	14,000
Japan	2	6	8	16,000
Netherlands	2	5	7	14,000
Norway	2	6	8	16,000
Peru	2	1	3	6,000
Portugal	2	2	4	8,000
Siam	2	.	2	4,000
Spain	2	4	6	12,000
Sweden	2	4	6	12,000
United States	2	8	10	20,000
	40	78	118	236,000
Monaco			2	French Frs. paper 6,000

*The principality of Monaco is treated on a special basis.

Publications of the Bureau.—In the month of January of each year, the bureau publishes an annual report.

A periodical publication called *Hydrographic Review* reports on:

(1) Subjects of hydrographic interest,
(2) Subjects allied to hydrography,
(3) The work carried out by the bureau,
(4) The work which it is preparing,
(5) The work which it proposes to undertake, and
(6) Any other subject of general interest with reference to hydrographic services and the bureau.

Should any matter appear to be of an urgent character it will be published and distributed without delay.

The American Director.—A vacancy in the board of directors was caused by the resignation of Captain S. H. Muller, of Norway, as from October 1, 1923. To fill this vacancy a special election was held, the following candidates being nominated:

Rear Admiral Albert Parker Niblack (United States)

Captain Gustaf Paul Reinius (Sweden)

Monsieur Charles Dominique Rollet de L'Isle (France)

Captain S. Scott-Hansen (Norway)

As a result of this election Admiral Niblack was elected and assumed office April 9, 1924.

Seat of the Bureau.—One of the reasons connected with the selection of Monaco as the seat of the bureau was the world-wide activities of the late Prince Albert I of Monaco, which have raised Monaco to such an extraordinary center for the gathering of scientific organizations. It was due largely to the energetic efforts of the late Prince Albert I that the bureau was established.

The Prince had a long practical career as a hydrographer and oceanographer, beginning in the year 1873 when he fitted out the schooner *Hirondelle* which eventually made twenty-five cruises that produced valuable scientific results. Later he fitted out three steam yachts for research work.

Prince Albert founded the Oceanographical Museum at Monaco, opened in the year 1910, which consists of a great building and unique laboratories and collections.

Prince Albert's name will ever be associated with the scientific works of the sea. That a prince should not only interest himself deeply in such pursuits, but should achieve world renown in consequence of his success in the practical pursuit of knowledge is surely remarkable; the temptations to a prince to forego any participation in serious studies must obviously be great, but Prince Albert was the truly princely type of man who resolved that the world should benefit through his position, fortune, energies and opportunities.

OUR CRUISE IN THE KURILES

By Lieutenant Commander H. H. Frost, U. S. Navy

ON THE afternoon of March 28 the *Ford* and *Pope,* having returned to Manila after the completion of division battle practice and two depth charge practices on that and the previous day, received definite information that the two ships had been selected, in accordance with their requests, to proceed to the Kurile Islands to assist the world flight of the U. S. Army Air Service.

For the last few days it had been known that our selection was probable and we had been reading the various information which was available concerning this little-frequented part of the world. In the *Asiatic Pilot,* Vol. II, we found the following:

"The fog in which these islands are constantly enveloped, the strong currents running in the various straits between the islands, the steepness of their coasts, and the lack of sheltered anchorages render it necessary for the navigator, particularly in a sailing vessel, to exercise the greatest vigilance when navigating in the vicinity of the Kuriles. The climate is cold and damp, rain and snow falling in every month. Gales are liable to occur in any season. Approaching in thick weather, warning is given by large fields of kelp which grow about all the islands in depths up to fifteen fathoms; the roaring of the sea lions and the cries of the birds as well as sulphur fumes from the mountains, when to leeward of them, all denote the presence of land."

An examination of the older charts showed various points to be marked "Sea Lions," in the same way that fog horns and sirens are shown in more civilized locations. It must be confessed, however, that no actual assistance was received from this novel aid to navigation.

Early in the morning of March 29 both vessels went alongside the *Black Hawk* to expedite our various preparations. In the afternoon the commanding officers attended a conference on the flagship, where we were furnished with such meager information as was then available and operation orders which left us all the necessary freedom of action. Monday and Tuesday, March 31

and April 1, were busy days for us. Seemingly inexhaustible amounts of provisions were taken on board; nearly all the next quarter's allowance of supplies was received; our winter clothing, which had recently been turned in, was received back again; about eighteen moving picture shows were taken by each ship; the interior of the midship's deckhouse was filled with sacks of potatoes and other fresh provisions. That predominating feature of naval life, the paper work, was brought up to date.

At 1800, April 1, both vessels shoved off from the *Black Hawk* and proceeded out from Manila Bay; no formation was used as fuel economy was one of the important questions before us and the *Pope* merely kept in signal distance of the *Ford*. We saw our last sunset over Mariveles, the radio masts at Cavite faded out in the dusk, we passed under the lights of Corregidor and stood up the Luzon coast in a beautiful starlight night. After a rough but comparatively uneventful voyage we arrived off the Izu promontory in the morning of April 7; proceeded past Oshima and into Tokyo Bay between the ruined forts and anchored in the late afternoon off the Yokohama breakwater. We were kindly assigned a buoy inside the breakwater and shifted berth immediately.

After a brief conference, noon, April 10, was set as the tentative sailing date from Yokohama. From the instant of our arrival until the time of sailing our time was taken up in making the numerous preparations for our cruise. This included many official calls at Yokohama and Tokyo; almost constant conferences with Lieutenant Commander Garnet Hulings, U. S. Naval Attaché, Major Philip Faymonville, U. S. Millitary Attaché, First Lieutenant C. C. Nutt, Air Service, U. S. Army, who had charge of all arrangements for the flight in Japan; discussions with officers at the Japanese Navy Department concerning communications and the cooperation with their Eighteenth Destroyer Flotilla; arrangements for taking on press correspondents and moving picture men; letting contracts for and obtaining fresh provisions; fueling to our maximum capacity, and obtaining all the information we could concerning conditions in the Kuriles. This last question was one concerning which there was a vast difference of opinion; some information indicated that our cruise was almost impracticable; on the other hand, an old sailor who had sailed in the Kuriles for many years assured us that we would see neither ice nor fog

during our entire cruise. In the face of this conflicting data we believed that the truth lay half way between the two extremes, but decided that at first we would take every reasonable precaution until we had time to see for ourselves what the real conditions were.

At 1300, April 10, the *Ford* and *Pope* shoved off and proceeded out of Tokyo Bay and up the eastern coast. The *Ford* had on board, in addition to the five line officers attached to the ship and the division medical officer: Lieutenant I. Yamaguichi, I. J. N.; Captain S. Yamase, General Staff, I. J. A.; Captain G. O. Clark, U. S. A. (representative of Lieutenant Nutt); Ensign A. H. McCollum, U. S. N. (language officer), and Mr. Linton Wells, Associated Press.

At 0815 the next morning we took our departure from Kinkasan Light and set the direct course for Shikotan Jima, an island at the southern end of the Kurile chain. During the forenoon we watched for a time two trawlers attacking a school of whales. When quite close to the whale a harpoon was shot into it with a gun. The harpoon carries an explosive charge which, in addition to wounding the whale, drives the harpoon apart in such a manner as to fix it securely in the flesh. The whale is then allowed to tow the trawler for a time; when it is nearly exhausted a cask is attached to the line and both it and the line are thrown overboard, thus buoying the whale. These casks carry a bamboo pole with a red flag; by the time of our arrival four whales had already been buoyed, so the whalers apparently had a most profitable day's work ahead of them. The weather continued perfect during the day; the temperature of the air dropped to 37° and that of the sea water to 35°. Until midnight it was bright moonlight; at that time we slowed to ten knots as the ships were now well within the line on the chart marked "Field ice may be met within this line in February, March and April."

At 0700 the next morning, speed having in the meantime been increased to fifteen, we headed directly for Shikotan Suido (channel) with the idea of attempting to pass through it and then Kunashiri Suido, running along the northwestern coast of Yetorofu to our destination, Bettobu Anchorage. As Kunashiri Suido was the locality in which ice was known to be most prevalent, we had no great hopes of being able to carry out this plan but desired to clear

up first the most direct route and to know the worst about the ice fields; we would also be able to learn something about the best methods of cruising in the vicinity of the ice while we had still some hours of daylight. Due to an error of one minute in finding the C-W we actually headed toward a point fifteen miles to the westward of Shikotan Suido and this caused a situation which for a time puzzled us considerably. About 0900 we began to see indistinct land on both bows. At first we saw what appeared to be yellow sand hills; somewhat later we saw what appeared to be black, rocky cliffs; there appeared to be one yellow peak which was considerably higher and more prominent than the other land. The visibility appeared to be about fifteen miles. None of the land in sight corresponded to Shikotan Jima, which was a tree-covered island about 1,200 feet in height. As we proceeded on for an hour and a half the land still seemed to be very distant and the yellow hills got higher and higher out of the water. The prominent peak finally grew into quite a mountain. All this time we had been reading over the *Asiatic Pilot* and under the heading of Kunashiri Jima had noticed the following: "The chief feature of the island is Cacha Dake, situated near the northeastern end; this magnificent volcano is 6,051 feet high, a truncated cone in shape with a second peak rising out of the crater." All of a sudden the idea struck us that our yellow peak must be Cacha Dake, seventy miles away, and about one hundred when first sighted. A bearing of the peak, combined with our discovery at this time of the error in the C-W for our last sight, now fixed our position and cleared up the situation. The yellow sand hills in reality were the snow clad mountains of Kunashiri Jima. The black, rocky cliffs were a chain of small islands extending out to the northeast from the end of Nemoro Promontory on Hokkaido. Behind these islands we soon saw the next line of low sandy islands which paralleled them. Course was changed for the entrance to Shikotan Suido and the island of that name was finally discovered.

At noon we passed through the Suido and headed toward Kunashiri Suido. A scene of remarkable beauty lay before us. On the port hand, extending as far as the beam, were the mountains of Kunashiri, surmounted by the magnificent volcano, Cacha Dake. On the moutains the black ridges stood out, while snow filled the valleys and crevasses between them. On the starboard bow were

the 4,000-foot mountain chains and volcanoes of Yetorofu which were completely covered with snow. On the starboard quarter was the rolling tree-covered island of Shikotan which was still partly snow covered. The sea was dead calm and innumerable ducks flew out from under our bows as we steamed along.

At 1500 the lookout reported two white objects ahead and they were soon made out to be large pieces of ice. About a mile behind them was the ice field. We steamed up close to it and saw that the field extended entirely across the Suido and ran down to the southward from the southwestern end of Yetorofu. This line of approach to Bettobu was barred. It was then decided to head to the southward, work around the field to the eastward and when clear of it head for Yetorofu Kaikyo (strait); we would be able to arrive by daylight the next morning and would try to get through around the northern end of Yetorofu. We accordingly skirted the field at distances of from one to five hundred yards. The field was frozen solidly together, was probably about twenty feet thick, and was inhabited by colonies of sea lions who were lying out on the ice to sun themselves. Every fifteen minutes the temperature of the sea water was taken. Alongside the fields it was about 28°, increasing to 30° about one mile off. The field proved to be much larger than we had expected; in fact it extended about fifty miles to the southward. When darkness came on we were still skirting the field and endeavoring to work our way to the northeast. At first we were fortunate enough to have bright moonlight and this was of great assistance as the fields showed up in it as much as two miles away. Their formation was very irregular with sharp promontories and deep bays. After rounding a promontory the desired course, 30° true, would be set and a sharp lookout kept. Soon we would see the ice field again; often it would be ahead of us and frequently would extend far on our starboard [outboard] bow. Course would be changed about 60° to the right and signal made to the *Pope,* which maintained position about 1,000 yards on our outboard beam and conformed to our movements. As we approached the field we would be able to determine the position of the end of the promontory and make such additional changes of course, often as much as a total change of 120°, as would clear it by about 300 yards. This would take us through the fringe of small pieces; often among these pieces there would be some of

considerable size and these constituted the principal danger; but it was always possible to see them about one hundred yards ahead and to avoid them with the rudder. Our speed varied between fifteen and ten knots during this period of good visibility. As the evening wore on the sky began to become overcast and the visibility became very peculiar. It was no longer possible to see the fields at any distance and often low-lying clouds on the horizon presented the same appearance as the fields in the moonlight previously had. Once we stopped on account of a very black streak on the water which we thought might be ice but which proved to be merely an optical illusion. At 2330 speed was decreased to five knots as the moon had set and the visibility was very low; fortunately, just at this time we must have cleared the field for no further ice was sighted until the morning. The weather conditions and the position of the ice field were reported to the Eighteenth Destroyer Flotilla through the Naval Radio Station at Ominato.

At daylight no ice was in sight; the sky was still overcast and the visibility was about two miles. Speed was increased to fifteen knots; at 0600, in the approaches to Yetorofu Kaikyo, more field ice was sighted on both bows. This was a separate field which had come through the Yetorofu Kaikyo and course was changed 90° to the left to skirt the field on our starboard hand. When the end of the field was reached, course was changed to the northward. At 0700 some white patches high in the air were sighted and these eventually proved to be snow fields on the mountain slopes of Yetorofu. Shortly afterward the coast was seen and the position was fixed by a group of rocks whose height was shown on our fine charts. Our dead reckoning position was almost exactly right, even after all the maneuvering of the night. On attempting to work up the coast to the northward it was soon determined that the field extended right in to the land and that we could not get around the northern end of Yetorofu. Our only chance of getting to Bettobu was to make a wide detour to the northward and endeavor to skirt the field on the port hand in the hope that it did not extend all the way across the *kaikyo* to the southern point of Uruppu. It appeared most improbable that we could get through this way and furthermore it was almost a certainty that, if both the northern and southern ends of Yetorofu were closed by ice, the entire northwestern coast would be covered by the field and anchorage at Bet-

tobu would accordingly be impossible. We were confirmed in this opinion by reading in Snow's book, *In Forbidden Seas,* an account of the field ice off Yetorofu in May.

The possibility of our not being able to reach Bettobu had been in our minds for some days and alternate plans had been under consideration. Hitokappu Wan, in the center of the southeastern coast, had impressed us as being superior to Bettobu and, after some negotiations, our liaison officers consented to our proceeding to that bay, which in the accounts of the old sea-otter hunters was called "Jap Bay" and was very famous. We ran down the coast close under the mountains and at 1000 anchored off the Japanese fishing village.

In the conference which was held, all concerned—American and Japanese, Army and Navy—agreed that the air base should be changed to Hitokappu Wan. This was further confirmed by reports from the shore to the effect that the entire northwestern coast was covered with ice which was expected to remain until May. The Japanese Government consented to the change of base.

In the evening three vessels of the Eighteenth Flotilla stood in and anchored. The flotilla commander informed us that after receiving fuel from the *Amatsukaze* he would proceed in the *Tokitsukaze* to Paramushiru, the next to northernmost island of the group, where at Kashiwabara Wan the planes were first to reach Japanese territory.

At daylight the next day the *Ford* went alongside the *Pope* in a rapidly rising sea and received 10,000 gallons of oil; upon the completion of oiling it was decided to anchor until the weather moderated. At 1230 it appeared to be slightly better and the *Ford* proceeded out of port. We skirted the field ice off Yetorofu Kaikyo and set the course to parallel the chain during the night at a distance of thirty miles; speed was made ten knots at dark. Only small pieces of ice were passed but the temperature of the sea water, 28°, showed that more field ice could not be far distant. A moderate fog set in and at midnight when the moon set, speed was further reduced to five knots.

At daylight, April 16, speed was again increased to fifteen knots and we headed in toward Shimushiru Jima. The fog at times was very dense and the coast would be paralleled; then we could see perhaps a mile and the course would be set in toward the land again.

Finally at 0916 we sighted the land and got a good fix on the northern end of the island. Oscillator soundings were of great use in making this landfall. It was intended to skirt the island chain, but the fog was so dense that we were compelled to head out gradually again until at dark we reached our standard distance of thirty miles from the land. This later proved to be an unnecessary precaution as the currents did not interfere with our navigation in any important degree.

At 0432 the next day, April 17, we set the course northwest to hit the center of Paramushiru and did. The visibility was about one mile; there was heavy rain and a strong southeasterly wind was picking up. At 0545 a small island was sighted and soon another; then the snowy mountainsides of Paramushiru appeared, visible up to about 1,000 feet, their tops being obscured by the low-lying clouds. Speed was slowed to five knots and we paralleled the shore skirting the kelp beds; after fixing our position, speed was again made fifteen knots and we stood up Paramushiru Kaikyo between that island and Shimushu. On the western side of this strait was Kashiwabara Wan, the place selected for the air base, but, as the wind was now blowing about seven right into that poorly protected harbor, it was decided to pass through the strait where on the northern side of Shimushu we would find a good lee at Cod Bay. We anchored there and during the day rode out a gale, the barometer falling to 29.41. During the evening the storm center passed over us and for a time there was a dead calm, but this was followed by a strong northwesterly wind which put us on a lee shore with our stern about 200 yards from the breakers. During a most anxious night the wind and sea continued to rise and finally at 0240 we got under way. Until daylight we stood off the coast at five knots and then ran down the *kaikyo* and anchored at Kashiwabara Wan where there was now a good lee. Where we anchored the current was about three knots and we could see the bottom to be alternate patches of rock and fine sand.

During the forenoon the *Tokitsukaze* stood in and anchored outside of us. Now our long period of waiting commenced but there was always sufficient work and recreation to keep us well occupied. Parties went ashore and landed on the beach daily; it was impossible to penetrate into the interior on account of the deep snow which covered everything but there was a narrow

stretch of beach between the low water mark and the snow cliffs at low water. Some of our people walked along the beach for three miles and discovered a Japanese fishing village at Murakami Wan where, after Ensign McCollum had established the fact that they were Americans and not Russians, the two caretakers greeted them with enthusiasm and broke out such delicacies as they retained after their six months' existence out of contact with the rest of the world. With great pride they showed how they had kept account of the date by their calendar, but, forgetting the fact that it was leap year, they were in error by one day.

The most cordial relations were established with the *Tokitsukaze* and we passed many pleasant afternoons together. Our moving pictures proved most entertaining for the Japanese and frequently we had them shown on the *Tokitsukaze.* Our cooperation was perfect throughout. Our liaison officers proved such good shipmates that they soon joined us in singing "Old Sailors Never Die," and were always considered on the same basis as the ship's officers. Linton Wells commenced the issue of the *Paramushiru Breeze,* using press news from San Francisco, Hawaii, Guam and Cavite, as well as intercepted reports about the flyers from various other stations. Later in our stay it was voted to change the name of his paper to the *Gale* instead of *Breeze,* as the former was deemed more appropriate to associate with Paramushiru.

Our communication problem was a most interesting one. When we first arrived there was so little interference in our vicinity that long ranges were covered at night. We communicated almost daily with St. Paul, Pribilof Islands; the *Pope* at Hitokappu Wan; the Japanese Commercial Radio at Otchishi near Nemoro; the destroyers of our division at Yokohama or Kobe and many merchant vessels. One evening messages were exchanged with the S. S. *Resolute,* which was just crossing the equator, from our position in 51° of latitude. On the evening of the arrival of the planes about 1,500 words of press were received in Tokyo within eight hours of the time of their arrival. Our communication with the *Tokitsukaze* by semaphore, flashing light and radio became quite proficient; English characters were used with either English or Japanese language.

Our stay was enlivened by the extremely erratic weather conditions. The barometer rose and fell with great rapidity and its

variations were usually accompanied by violent winds from rapidly changing directions. There was hardly a day in which there was not bad weather in some form; force seven or eight winds, heavy snow or dense fogs, and at first we often stood by with the engines, until we became convinced our anchor would hold. The officer-of-the-deck slept in the emergency cabin and an extra man was kept constantly on watch ready to let go the second anchor. One afternoon a wind suddenly springing up rolled up such a surf that our party ashore was unable to launch the whaleboat through the surf; a line was shot ashore from the motor sailer with the line-throwing gun and the boat pulled off just before dark.

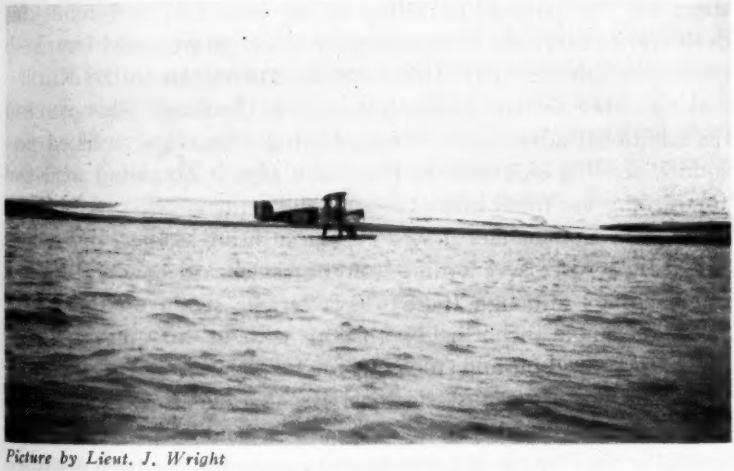
About 1700, on April 23, a whirlpool suddenly swung both the *Ford* and the *Tokitsukaze* around through over 90° and the strong current caught the ship on the beam; the anchor immediately broke loose and we commenced to drag rapidly down on the *Tokitsukaze;* the second anchor brought us up only fifty yards distant from her. The engines were warmed and berth shifted considerably farther into the bay where we were almost out of the current, but had to accept a depth of from three to two and a half fathoms; due to her far superior anchoring gear the Japanese destroyer, though in a less favorable berth, held securely. In our new position we had no further difficulty.

During April 26-27 we received reports from the *Pope* at Hitokappu that she was experiencing a violent gale with the wind at times as much as force twelve. We were fortunate enough to miss this storm, except for heavy snow which continued for forty-eight hours and covered the whole ship with a four-inch coat.

On April 30 the Canadian ship *Thiepval* came in with Colonel Broome, Royal Air Force Reserve, on board. This little craft had been on a remarkable cruise through the Aleutians, Kommandorski Islands and Kamchatka laying down moorings and supplies for the British world flight. She carried on her deck spare parts enough to complete an entire new plane, which our destroyers later transported to India to replace the plane destroyed there. Among numerous interesting stories we heard was the following description of the methods used to take on forty tons of fresh water in a day; the ship was anchored close to the shore, where a stream ran down from the mountains; the stream was dammed and a hose led from the dam to the beach for filling the ship's boat; when the

Picture by H. H. Frost

ASHORE ON PARAMUSHIRU



Picture by Lieut. J. Wright

NELSON'S PLANE AT KASHIWABARA

boat was three quarters full it was hauled to the ship by a line and hoisted, the plug was pulled out and the water allowed to run down through a succession of ventilator cowls into the ship's tanks; two boats were used, one being at the shore and the other at the ship.

Our relations with the *Thiepval* were most cordial and with the liquid refreshment they were able to offer and our moving pictures we were able to have some most enjoyable parties. We endeavored to assist Colonel Broome in every way, while he furnished us with much valuable information and told us to use his moorings if it became necessary. We pooled our combined resources.

On May 1 it was decided that some radical step must be taken to replenish our stocks of fuel and food. At first our food supply had seemed almost inexhaustible, but now we had long since been reduced to strictly canned food and there was barely two weeks' allowance of that, even with reduced rations. The following decision was therefore made: (1) To instruct the *Pope* to proceed to Paramushiru at once. (2) Upon her arrival to transfer to her all the fuel and stores we could spare and then proceed with the *Ford* to Hakodate, the *Pope* remaining at Paramushiru. (3) To request the division commander to send a destroyer to meet us there for the purpose of filling us up with fuel and food, this destroyer to carry the division supply officer so we could buy fresh provisions ashore. (4) The *Ford* then to return to the Kuriles, making either air base as was necessary at the time. This plan had the additional advantages of transferring officer and enlisted personnel, sending sick men to the *Black Hawk*, obtaining mail and forwarding our many official reports and returns. At 1430, May 3, Lieutenant Commander J. W. McClaran brought the *Pope* alongside us in a force seven wind from our starboard bow and made a fine landing; although there was a terrific strain on the anchor chain, the single anchor held both ships without dragging. At 1915 the *Ford* shoved off and stood out for Hakodate.

Several days previously Colonel Broome had stated that he intended to use the lake at Hitokappu as a landing place; after the arrival of the *Pope* at Kashiwabara the question had been discussed with the commanding officer and he had stated that, due to the ground swell in the bay at Hitokappu, landing would be very difficult at all times; he further stated that in the event of a storm while the planes were in the bay there would be little chance of saving

them. A party from the *Pope* had visited the lake and expressed the opinion that it would be suitable as a landing place. Accordingly, a despatch was sent by the commanding officer to the naval attaché at Tokyo asking him to obtain the permission of the government to use the lake. This was kindly granted. Some time later, when Colonel Broome arrived at Hitokappu, he sent another message to the *Ford* recommending the use of the lake and stating that it was clear of ice and suitable in all respects. When the *Pope* returned to Hitokappu, Lieutenant Commander McClaran concurred in this opinion and established his buoys near the southern shore of the lake. This change of the air base contributed greatly toward the success of the flight through the Kuriles and we were greatly indebted to Colonel Broome for first suggesting it.

We had the usual assortment of weather: strong head winds force six for the first day, then fog until noon of the second day; after that the weather was quite good and we were able to see Shikotan Jima; Otchishi Zaki and Yerimo Zaki, on the eastern and southern ends of Hokkaido respectively, were passed and during the forenoon of May 6 we went through Tsugaru Straits, anchoring in the Hakodate Harbor at 1130. There were no Americans in the city but we were warmly welcomed by the British colony.

Instead of sending one ship to meet us at Hakodate, Commander J. S. Abbott, our division commander, came himself in the *Peary*, accompanied by the *Truxton*, Lieutenant Commander T. H. Winters. At 1730 these ships came in and the *Truxton* secured alongside the *Ford*. All through the night oil was being pumped over and canned food being carried over and stowed below. Early the next morning the *Truxton* left for Shanghai with personnel to sail on the *Chaumont*, and the *Ford* came alongside the *Peary* to receive additional oil and food. By 1915 all was in readiness to proceed and the *Ford* shoved off and proceeded to the northward while the *Peary* went down to Kobe.

On May 8 the weather was good until after we passed Shikotan Jima at 1640; from here we had planned to run through Yetorofu Kaikyo and proceed along the northwestern side of the chain; but the decreasing visibility, falling barometer and increasing wind made this a little too risky, particularly as we would have to go through the *kaikyo* at night relying on dead reckoning and oscillator soundings. During the evening, reports came in of the terrific

storm which the *Pope* had fought through two days at Paramushiru. The wind was estimated to be 100 miles an hour and photographs taken at the time confirm this; the snow was very thick; the *Pope* dragged with both anchors down and had to zigzag back and forth in the narrow strait for most of two nights under conditions which involved the greatest danger. Throughout this storm two Japanese destroyers held without dragging, an additional proof of the superiority of their anchoring gear.

Having escaped this storm we believed that we would have fine weather for the rest of our trip, but during the forenoon of May 9 strong easterly winds were accompanied by a rapidly falling barometer. During the afternoon the wind reached force eight; speed was slowed by steps to eight knots and finally, at 2135, we realized that we were in for a real gale; speed was slowed to five knots and the ship headed to the eastward so as to bring the sea about two points on the starboard bow. By 0200 the barometer had reached 29.00 and was still falling. The seas were mountainous but the ship rode them beautifully and took on very little water. This course was held until 1000, the barometer then steadying at 28.83. At that time it was decided to attempt to make good some distance toward our destination and it was believed that by running due north we might be able to sight Onekotan Jima before dark. Speed was accordingly brought up to fifteen knots and the sea put two points abaft the starboard beam. The ship behaved surprisingly well under these conditions, took over very little water, and did not roll excessively except that once in a while we would go over about 40° to port. During the afternoon the oscillator soundings decreased to seventy-five fathoms and at dark we must have been within about seven miles of the land; at that time we headed again to the eastward and hove to with 5 knots speed.

Our situation was far from satisfactory; the visibility was about one-half mile; our position was absolutely unknown; throughout the night the depth was too small to get oscillator soundings; we were in the immediate proximity of a number of high rocky islands; the currents were reported to be as much as 5 knots. Like St. Paul, "we wished for the day," and there was a distinct feeling of relief when about 0230 the first signs of dawn began to appear. We then headed again to the north for Onekotan and at 0400 sighted breakers ahead. They were splashing a hundred feet in

the air against high, black, rocky cliffs about one mile ahead and we paralleled the coast at about this distance. The sea and barometer were unchanged and the ship rolled somewhat heavily, although it was nothing to compare with our record roll of 53° to starboard during the night.

We definitely fixed our position by a high rock at the end of Onekotan Jima and found that our dead reckoning for about sixty-two hours was only ten miles in error, and we hit the exact spot we were aiming for. We ran across Onekotan Suido and passed to the northern side of Paramushiru to get into the lee. Here the wind dropped to a calm, but a heavy ground swell from the northward sent seas over the forecastle. As the *Pope* reported having had another strong gale in Kashiwabara Wan, it was decided to anchor in Kujira Wan on the northern coast. Passing close under Shiriyajiri Dake, a volcano 5,894 feet high, we anchored about 800 yards from the lower slopes of Chikura Dake, another beautiful mountain 5,957 feet in height. In response to our despatch the *Pope* arrived at 1600 and came alongside; for a time the ships rolled so heavily in the swell as to part a heavy wire line, but soon they swung around with their heads into the swell and it was possible to transfer to the *Pope* one half of our provisions. At 1800 the *Pope* shoved off to take station at Hitokappu Wan.

Early the next morning the *Ford* got under way and stood along the western coast of Paramushiru. Although the barometer was still 28.85 the weather was perfect and the scenery was wonderful. We passed close under the volcanic island of Araido, a perfect cone six miles in diameter at the base and 7,654 feet high, which was completely covered with snow. Coming down Paramushiru Kaikyo from the north we passed the fishing village of Murakami Wan and saw the wreck of an 1,100-ton merchant vessel which had been lost in the recent storms with her captain and seven men.

At Kashiwabara Wan we found the *Tokitsukaze* and *Hamakaze* and anchored in four fathoms close in to the beach. In the afternoon we renewed our friendships with the officers of the *Tokitsukaze,* agreed on a fine radio schedule and arranged for receiving the Japanese radio weather reports. This conference was carried on in the most friendly spirit and Commander Morita even offered to get the *Tokitsukaze* under way and give us his berth.

The planes were now at Attu, distant about 600 miles, and as

the weather was so fine we recommended by despatch to the *Haida* that the flight be made the next day. This message was repeated the next two nights, but the storms had passed to the Aleutians and the flight commander reported that the wind at Attu was force nine. In the meantime we passed the time in arranging for the Japanese at the fishing village to haul out our planes, if it should be necessary, on slopes of snow which they would form by undermining the snow cliffs at the high water mark on the beach; in inspecting the Japanese destroyers and showing the Japanese officers around the *Ford,* and in laying out three moorings for the planes in the southwestern corner of Kashiwabara Wan.

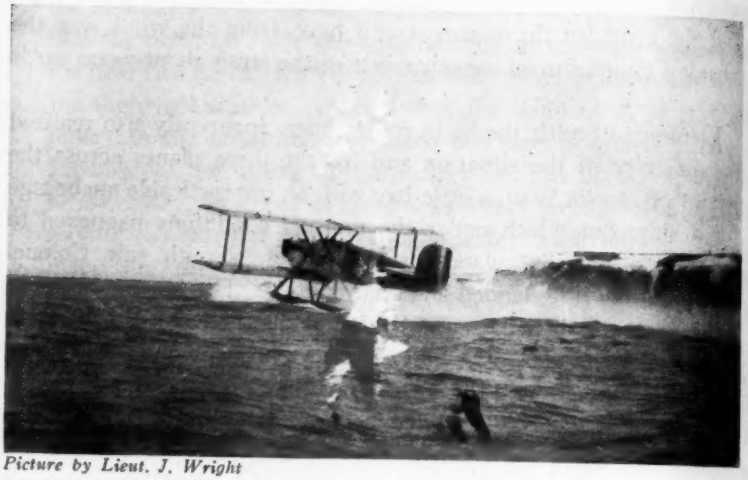
On May 16 we noticed that the signals from the *Haida* could be heard in the daytime and assumed that she had taken position midway between Attu and us. We could obtain no statement from them as to their position. On this day the flight commander executed a daring plan. The weather had moderated at Attu enough for him to take off with a limited supply of gasoline sufficient only to reach Bearing Island, belonging to the Russian Government, and accordingly this flight was made and the planes reached their destination with only a slight reserve of fuel in their tanks. Fortunately, the Fish Commission vessel *Eider* happened to be on the right spot with a supply of aviation gasoline, so the planes were fueled and secured for the night.

The next morning, May 17, the Russian officials intimated that the departure of the planes was desired, and they immediately took off, ran over to the Kamchatka Coast and at 1130 appeared at Paramushiru. It had been considered undesirable to make any reports of the movements of the planes and so we were in complete ignorance of the fact that they had even left Attu. We were therefore taken somewhat by surprise when the signalman shouted down the wardroom voice tube: "The planes are in sight." Rushing on deck we saw the planes coming in at the entrance about one mile away in perfect formation. This beautiful sight and the roaring of the motors gave us all a real thrill, one we will never forget; but in one way the sight was not such a welcome one. The weather, which had until now been so perfect, had, during the forenoon, been showing the unmistakable signs of a storm; a heavy swell was coming into the strait, which the planes at their moorings would escape, but the wind was easterly, a direction from

which it had not blown since the first day we arrived a month ago, and the only lee the planes would have from the wind was the island of Shimushu on the other side of the strait about 3,000 yards away.

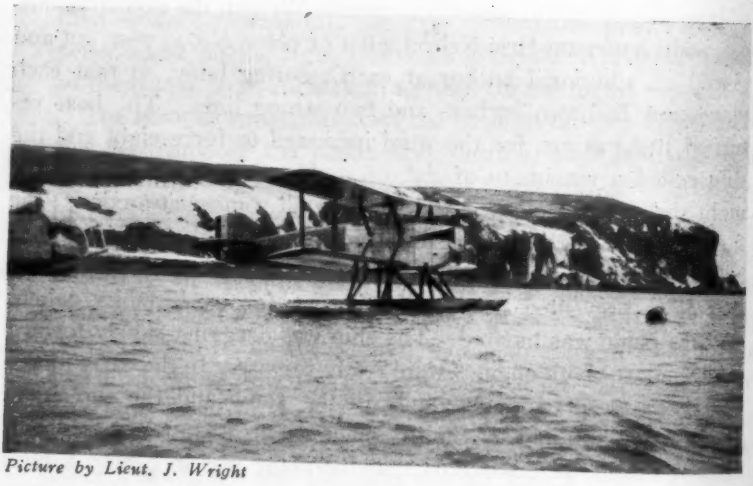
Lieutenant Smith, the flight commander, apparently also realized the difficulty of the situation and led the three planes across the strait to Kataoka Wan, a little bay with an impracticable anchorage for a ship, but which under the unusual conditions happened to be a good mooring place for the planes. Smith saw Colonel Broome's mooring, landed and secured to it. The other two planes returned to Kashiwabara and landed at our buoys; they were secured by our motor sailer and the crews brought on board where they were greeted with three cheers as they came up the gangway.

As the whirlpools and eddies in the strait made it impracticable for a small boat to cross it, the motor sailer was hoisted and the ship proceeded through the snow storm to Kataoka Wan; there we anchored near the plane in a very unfavorable position, the anchor dragging for some distance before it caught; the boat then brought back the plane's crew and the ship returned to Kashiwabara Wan. By this time the wind was about force six, but as it was still possible to use the motor sailer, Lieutenant Wright, the executive officer, and Lieutenant Eric Nelson, pilot of plane *No. 4,* went out and placed an additional anchor at each mooring buoy, so that each plane now had two anchors and two strong lines. The boat returned just in time, for the wind increased to force eight and the ship rolled a maximum of 24° on a side at anchor. During the night the storm continued and we were all somewhat anxious; the flyers said the planes had never been in such rough weather; every hour we turned the searchlight on the two planes near us but the snow prevented us from seeing as far as Kataoka, where Smith's plane was moored. The ship was dragging slowly toward the lee shore; both engines were ready for use. In the early morning there were temporary lulls in the snow and the signalman claimed that he could see Smith's plane. This was most reassuring, although later we discovered that the plane was in behind a high cliff so that it could not possibly have been seen from our anchorage. At 0800 our stern was about 50 yards from the breakers, so we got under way and anchored 300 yards farther out. At about 1400 the storm started to break up and our boat went out to ex-



Picture by Lieut. J. Wright

SMITH TAKING OFF FROM KATAOKA WAN



Picture by Lieut. J. Wright

SMITH'S PLANE AT KATAOKA

amine the two planes; our anchors and lines were in good condition, but the quarter-inch wire bridles of the planes themselves were practically worn through; one plane was being held by a single strand of the wire and, had the storm continued several hours longer, the plane would certainly have broken loose. New bridles were made on board ship of heavier wire and fixed to the planes.

The officers of the *Tokitsukaze* gave a fine reception for the flyers and welcomed them in due form to Japanese territory. Commander Morita sent the *Hamakaze* down to Shimushiru to report the weather and, in accordance with our request, she passed close by Smith's plane on the way out and reported it in good condition. The *Pope* also commenced sending weather reports at frequent intervals.

At 0200 of May 19, just at daybreak, the flyers went out to their planes, fueled and oiled them, and overhauled and tested out their engines. At 0500 our boat was hoisted and we proceeded in the *Ford* to Kataoka; the *Tokitsukaze* gladly volunteered to look out for the two planes at Kashiwabara and to give the flyers their breakfast. Smith's plane was quickly refueled and the engine started immediately. We then fired four yellow smoke rockets as the prearranged signal and as soon as Wade and Nelson were ready at Kashiwabara our men whom we had left on the *Tokitsukaze* fired four black rockets which stood out beautifully against the snowy mountains. We then fired the four red rockets which was the signal that Smith was starting and the *Tokitsukaze* answered with the same signal which signified that Wade and Nelson were starting. Smith was then informed by semaphore that the two other planes were taking off; he then took off, passing by the ship at a distance of fifty yards. The three planes concentrated, fell into formation, and at 0735 stood out the southern entrance of the strait.

The *Ford* then anchored at Kashiwabara and received the anchors which the *Tokitsukaze* had most kindly recovered for us; then, at 0835, we got under way from Kashiwabara for the last time. As we passed the Japanese destroyer her entire crew was on deck and they cheered us with Banzais, which we answered with three cheers. It was with sincere regret that we left this fine ship with which we had had such close and pleasant associations for the last month. The weather was clear with very strong variable

winds. For the first time we were able to enjoy the beautiful scenery along the southern coasts of Paramushiru, Onekotan, Harumukotan and Shasukotan, close under the lee of which we passed. The planes arrived at Hitokappu Wan at 1500 after a splendid flight.

During the next day we experienced the usual weather: strong winds, low visibility and fog alternately. At 1900, just as it was growing dark, we anchored in Hitokappu Wan near the *Pope*. After a conference with the commanding officer and the flyers and negotiations with the Japanese officers, it was decided for the *Ford* to proceed immediately to Kushiro on the southern coast of Hokkaido to furnish weather reports and to establish an emergency air base at that fine port.

At 2100 the *Ford* proceeded to sea. Fog was met at 2300 and continued through the night and next morning. As we got well under the lee of Hokkaido an offshore breeze cleared off the fog and we found ourselves in sight of Kushiro Light and only three miles off from our dead reckoning. At noon we arrived off the entrance to the port and were for a time puzzled by the arrangement of the breakwaters. At length it was determined that an entire breakwater was not shown on the chart. At high tide this breakwater was submerged but fortunately it was in sight when we arrived. We anchored in a fine sheltered position, but so small that we cleared the breakwater with our stern by only ten yards. Kushiro is a new city and apparently imbued with the "boom" spirit of some of our American cities. The *Ford* was the first naval vessel of any nation, according to local reports, which had ever visited the port. Great crowds of people swarmed down to look at the ship as soon as we anchored. The mayor, accompanied by the city council, all the city officials, the fortress commander and all the leading citizens came on board to welcome us. We received them with the crew at quarters on the forecastle. A Japanese band played our national air which was sung by a number of school children. The mayor then made an address of welcome and a reply, interpreted by Ensign McCollum, was made. We offered the mayor and his party such limited refreshments as we could offer after our long cruise. After the mayor left, several thousand sightseers visited the ship.

Our reception by the entire city was the most remarkable any

of us had ever experienced. A present, in the form of several boxes of food, was sent on board by the mayor; sampan men refused to accept money for taking the men ashore; presents of crabs and fish were made by fishermen; a fine steam launch was placed entirely at our disposal. An incident was reported in which a Japanese asked one of our men to go ashore; he replied that he had no money, whereupon the Japanese said that he needed none and urged him to come with him. One entire page of the newspaper was filled with news of the flight and the ship. In the evening the entire wardroom, with the exception of one officer, attended a fine dinner given by the city at which the greatest hospitality was shown.

At 0545 the next morning a report was received from the *Pope* to the effect that the planes had left fifteen minutes before. We fired the smoke rockets agreed upon as the signal that the planes were on their way. The entire population covered the hill around the lighthouse and other points of vantage to wait for the planes. Unfortunately a heavy northerly breeze was blowing and the water in the harbor was quite choppy. The motor sailer carried away its rudder by running on a submerged rock while laying out the buoys, but a steering oar was lashed in place and all three moorings were ready in time and located in the most suitable positions. At 0750, exactly on time, the three planes were sighted, flying in perfect formation. They passed the city at about 300 feet to give the people a good chance to see them and then kept on for Minato. The flight commander thought it inadvisable to land in the strong breeze but found it considerably more dangerous at Minato, which is but an open roadstead open to the north. Here at 1130 the planes landed and were fueled. At 1330 they were off again and at about 1700 landed at the Naval Air Station at Kasumigaura, near Tokyo.

After the planes left Hitokappu the *Pope* proceeded, in accordance with previous arrangements, toward Aomori in Mutsu Kaiwan at the northern end of Honshu. Once the planes were safe at Kasumigaura our duty of assisting the flight was temporarily ended; our main mission now was to make our full power runs before the end of May and we wished to take advantage of the cold circulating water which we would get in northern latitudes. After our long cruise both vessels made perfect scores on their

runs and it is believed that higher speeds were made by both ships than ever before, despite the fact that we had been out of dock about 160 days.

We had had hopes that our return to Yokohama would be made in good weather but were disappointed, for old Æolus let out his last two windbags and sent the center of a 29.34 depression over us. First the wind blew from the southeast and then shifted to the westward. The sea was very rough and the ship, having only 20,000 gallons of fuel on hand, rolled regularly from 30° to 40°. The rain was very heavy and the visibility of a high power navigational light was about four miles. Under these conditions we were rather glad when we sighted the light on Choshi Promontory. Katsuura Light was not sighted, although we must have passed within five miles of it, but, changing course on time, we hit Nojima Saki Light just right. After our first experiences in the Japanese stream, all our cruising had demonstrated the possibility of extremely accurate dead reckoning by destroyers.

As we swung around to the northward toward Tokyo Bay we got into the lee of the land, the weather cleared and Fuji stood up over the jackstaff. In the morning of May 26 we anchored off Yokohama and the cruise of the northern detachment, which had lasted for almost two months, was at an end. All of us were glad to have gained such valuable experience, to have made such an interesting and active cruise and to have done our share in helping the flyers on their way. Lieutenant Smith and his comrades had our most hearty admiration for their daring and modesty. We knew at first hand what risks they ran and what dangers they surmounted in accomplishing their mission of crossing the Pacific.

THE DADDY OF 'EM ALL

By Lieutenant Commander Walter E. Brown, U. S. Navy

FEW in the Navy realize that up to last fall we had in active cruising service a ship that dates back to the first half of the last century; a ship that, with the exception of the *Constellation* and the *Constitution,* is the oldest flying the navy commission pennant, but, unlike them, still moves; a ship that marks an innovation in naval construction and is really the precursor of all our modern ships.

The U. S. S. *Wolverine,* formerly the U. S. S. *Michigan,* was commissioned in 1844. Since that year she has never been a year out of commission. Besides this unique distinction, she is also the first iron ship in the Navy, the first iron ship of any kind on the Great Lakes, and at the time she was built possessed undoubtedly the best engines that the Navy had developed, engines which are still in her.

By the Rush-Bagot Treaty of 1817, England and the United States were each allowed two ships-of-war on the upper lakes, each ship not to exceed 100 tons and to have an armament not exceeding one 18-pounder gun. In 1836, during the Canadian Rebellion, England built in excess of these requirements, giving as an excuse that it was only for temporary purposes. However, that violation of the treaty on their part resulted in the authorization in 1841 of the iron side-wheel bark-of-war, *Michigan,* of 580 tons and mounting six 18-pounders. Strangely enough these two direct violations of the letter of the treaty, its temporary suspension during the Civil War, the presence of training ships for the reserves, and the use of armed revenue cutters on the lakes, has never been considered as abrogating the main stipulations of the treaty as to the building of warships. To this day, with the exception of the eagle boats, the government has not permitted any warships to be built on the Great Lakes for our own or for foreign governments, although the lake shipyards have frequently requested this permission.

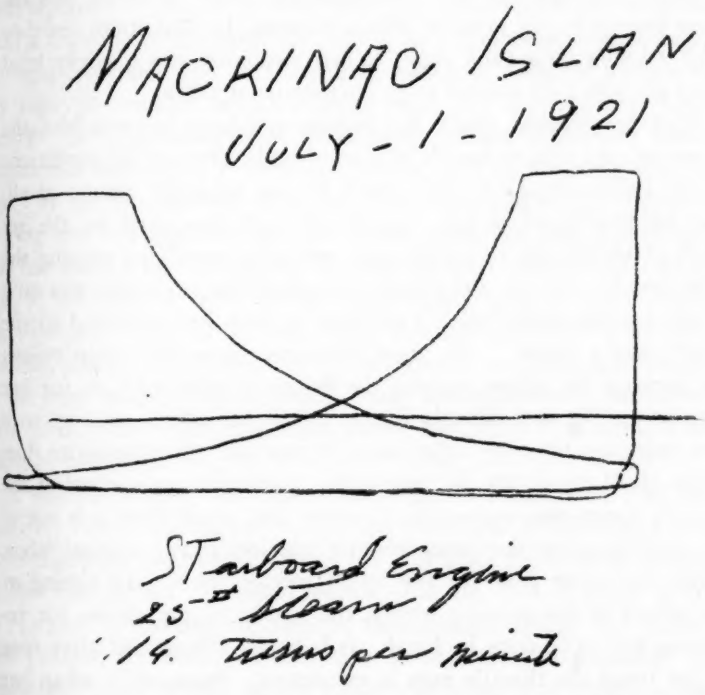
The hull of the *Michigan* was designed by Naval Constructor Samuel Hart, U. S. Navy. The fabricating and fitting of the hull was done in Pittsburgh and the parts shipped overland to Erie on ox-carts for erection. According to tradition the people of Erie would not believe that an iron ship could float and gathered in large numbers for the launching, confident that the *Michigan* would sink as soon as she struck the water. They were doomed to a double disappointment as the ship stuck on the ways and all efforts to move her failed. That night, however, after everybody had gone home, she launched herself, and Erie woke up the next morning to see her triumphantly floating in the harbor.

The plating strakes for the hull, only eighteen inches in width, are of three-eighths inch charcoal wrought iron; and again, according to tradition, they were beaten into shape with wooden mauls in a bed of sand. The frames are, of course, of wrought iron also. The construction was unusual for that day in that there were three heavy box keelsons running the entire length of the ship, with two shorter keelsons in the engine room to form the outboard foundations of the engine. This gives the ship in effect three keels, although on the outside only the center keel shows. More than one keel is not entirely unprecedented, as Samuel Pepys records in his diary the construction and successful trials of a ship with two keels built for the British Navy under Charles II, but the *Michigan* is probably the first successful ship built with either three keels or keelsons.

As the *Michigan* was designed to draw only nine feet of water so as to be able to enter any of the harbors in the lakes, her hull naturally had to have a more or less box-like shape, but, on the whole, her underwater design does not differ so very much from the flat-bottomed hulls of our latest battleships where the governing factors are much the same, the greatest possible displacement with a limiting draft.

How excellent was the material from which the hull was built and how well designed the ship was, is shown by the fact that she has weathered the storms of eighty summers without a major repair to her hull. Indeed when, in 1914, a section of the trough keel in front of the fire doors, where corrosion would naturally be the greatest, was removed for examination the material was found still in excellent condition with almost no deterioration visible.

The machinery in its design is of even greater interest than the hull. Wooden framed, with two inclined direct-acting condensing engines, cylinders of thirty-six-inch diameter and an eight-foot stroke, they were years ahead of their time, for until these were built the favorite engine for naval use was the Ericson oscillating type which had just been installed in the old *Princeton*. The *Michigan's* engines were designed by C. W. Copeland, though the original drawings should perhaps be credited to Haswell, and were



built in Pittsburgh by Stackhouse and Tomlinson. Like the hull they had to be transported to Erie by ox-cart. Long-stroke, slow-moving, low-pressured engines, they are wonderfully efficient, even compared with our modern-day prime movers. Indicator cards taken on them might be used as an illustration for the theoretically ideal card talked about in the text-books. With twelve-inch journals and a speed of twenty r. p. m., lubrication troubles and hot bearings are unknown. To those of us who have served as engineer officers in the old high-speed, high-pressure,

reciprocating-engined destroyers, having charge of such engines would be close to being in paradise.

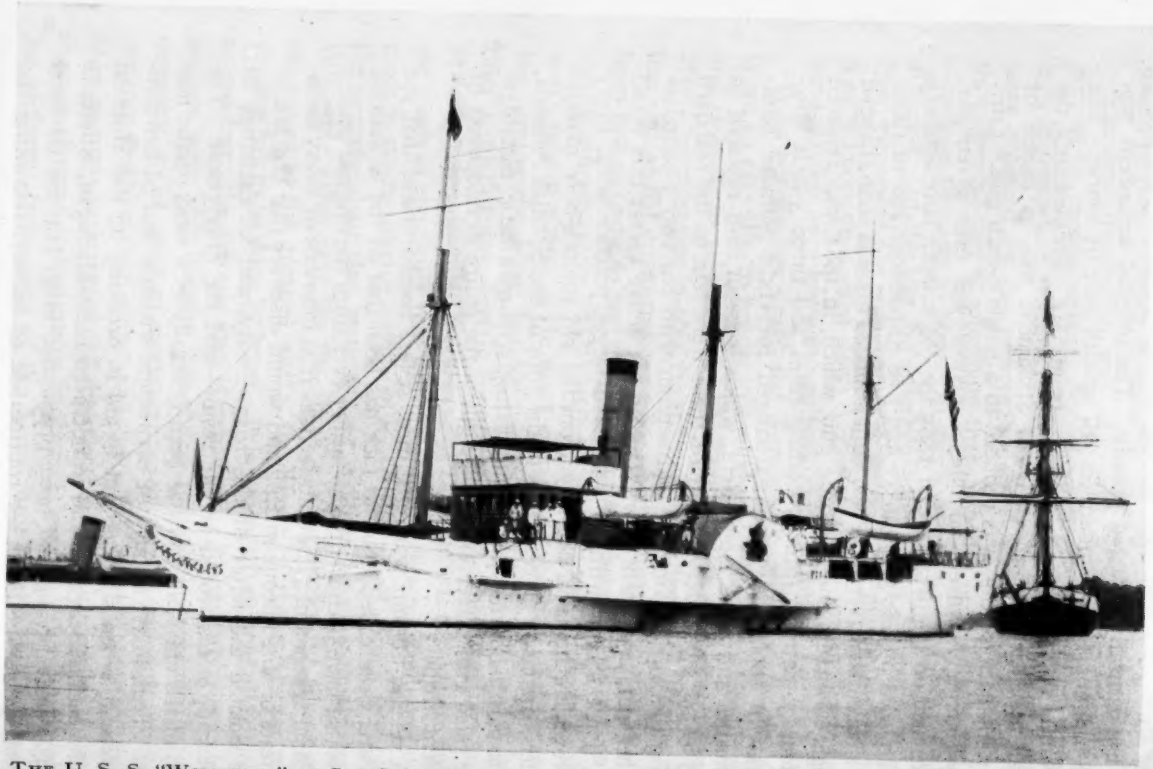
The first installation was of copper boilers carrying but six pounds of steam. About 1860 these were replaced by wrought iron boilers which remained in the *Michigan* until 1892 when they were replaced by the present boilers. A continuous record of thirty years—this is something that no boiler need be ashamed of—and yet two sets of boilers in this wonderful old ship have such a record. In the late '80's the allowable boiler pressure was cut from twenty to ten pounds, which reduced the maximum speed to 6 or 7 knots on a calm day. When steaming into a heavy head wind she was even known to go backwards at times.

With her shallow draft, flat bottom and large upperworks, she is not an easy ship to handle in a wind under the best of conditions and is liable to take a rank sheer for no apparent reason at all. Her idiosyncrasies in this regard are well illustrated by the remark of an old quartermaster who, when reproved for moving the helm first to one side and then to the other when the ship was on a steady course, answered: "You have to keep her confused so she won't take a sheer." He must certainly have had some reason for turning the wheel besides the desire to play with it, for her tiller is to this day directly connected to the wheel, and up to a few years ago the tiller ropes were of rawhide. It takes more than the touch of the finger that works the quartermaster's wheel of the modern steam-steering-engine to move that wheel; but it is not in the steering alone that maneuvering requires heavy manual labor. While the valve gear for the ahead motion allows the timing of the valves to the greatest nicety, the lifting of the valves for reversing has to be done by hand. It is heavy lifting and after nine or ten turns the throttle man is exhausted. Apparently when her engines were built backing was considered a luxury rather than a necessity. The ideas of maneuvering of ships formed from experience with sailing ships still held full sway. In fact the *Michigan* was bark rigged and fitted with a full suit of sails. Later she was changed to barkentine and, much later, to schooner rigged but, different from ships of the Navy for twenty years to come, she was auxiliary sail power instead of auxiliary steam power. It is doubtful whether she has used canvas for the last fifteen years, but during the early years of this century it was no uncommon sight to see her coming through the straits with her sails set.

The *Michigan's* armament during the eighty years of her existence has naturally changed greatly. The original armament was two 8-inch and four 32-pounders, all smooth bore of course. The following year, after a protest from Mr. Packenham, the British minister, that the original armament was in excess of treaty stipulations, this was reduced to a single 8-inch gun. Curiously enough, however, no official answer was ever given Mr. Packenham on his protest. In 1865 the old smooth bore artillery was replaced by one 30-pounder and five 20-pounder Parrot rifles, half a dozen howitzers and two light guns. This was soon changed to eight howitzers and a gatling gun, which, in 1884, was replaced by four 30-pounder breech-loading rifles and three 3-inch howitzers. In 1896 these were exchanged for six 6-pounder semi-automatics and three 1-pounders, which were in turn replaced in 1913 by six 3-pounders. Four of these were sent to the seaboard during the war, leaving the old veteran with but two 3-pounders for her main armament now. During her active career this vessel has, if not fought with, at least held target practice with, every improvement in naval artillery from the old smooth-bore muzzle-loaders, similar in all essentials to the guns of the Spanish Armada, to the most modern type of quick-firing, semi-automatic, cartridge-case rifled gun. Her experience spans the entire development of modern artillery.

A veteran of four wars, the most severe bombardment that she has ever been called upon to face has been that of the diplomatic notes that have been written about her ever since the original protest of Mr. Packenham. It would seem as if at intervals of every twenty years or so someone in England would discover that the *Michigan* violated the letter of the 1817 Treaty, and an exchange of diplomatic notes would be the result—and the only result. The duty of the old *Michigan* has been generally of a most pacific nature. She did have a touch of excitement within a year of her commissioning when she was sent to aid in breaking up the Mormon settlement on Beaver Island in northern Lake Michigan, where, in 1843, James Strang had been proclaimed king, but for the next twenty years she lived her routine life of survey, recruiting and regular cruising from one end of the lakes to the other.

During the Civil War she again had a touch of active hostilities. The Confederates, working from Canada, had hatched a plot to



THE U. S. S. "WOLVERINE" AS SHE IS AT PRESENT. THE BRIG ASTERN IS THE "NIAGARA," PERRY'S FLAGSHIP. THERE ARE LARGE TRAP DOORS ON THE TOP OF THE PADDLE WHEEL BOXES FOR ACCESS TO THE WHEELS. IN HEAVY WEATHER THE SEA COMPRESSES THE AIR INSIDE THE PADDLE BOXES AND BLOWS THE DOORS OPEN. A NOTE FROM AN OLD NIGHT-ORDER BOOK READS "DO NOT CALL ME UNLESS SIDE PADDLE BOX [illegible] BEGIN TO

free the prisoners held on Johnston's Island, near Sandusky, seize the *Michigan,* and bombard the cities of the Great Lakes. Fortunately the plot was discovered, the boats of the plotters were sunk, and the ringleaders themselves were brought on board the *Michigan* as prisoners. The actual leader of the plot was afterwards hanged at Governor's Island.

This was the last excitement she was to know in her staid and placid existence. During the Spanish-American War and the World War she was used as a training ship. Other times she did valuable survey work, annually conducted the summer cruise of the naval militia as flagship, and represented the Navy to the people living on the shores of the lakes.

There was always excitement in the resort towns of upper Michigan when the naval militia squadron, consisting of the wooden ships *Essex, Gopher, Hawk* and *Yantic,* and the converted yacht *Dorothea,* with the *Michigan* as flagship, came into sight, steaming at a standard speed of 6 knots, and the *Michigan* was easily queen of them all. For not only was she the largest, but she was a regular ship of the Navy, with regular officers and a crew who were tattooed and told tall tales of foreign cruises.

In 1905 the name *Michigan* was changed to *Wolverine* so that the old name could go to the new battleship then building. The new *Michigan* has already hauled down her commission pennant for the last time and gone to the breaking up yard, while the *Wolverine* still proudly flies her pennant first hoisted eighty years ago. In 1910 she was turned over to the naval militia of Pennsylvania and under their charge she has continued in her appointed work.

Last summer she met with her first serious accident. To quote from a letter of her commanding officer at the time:

> On August 12, 1923, while on a training cruise for the reserve force, and just as she had entered the head of Lake Huron, there was an awful bang and a cloud of steam.
>
> A first thought was that the ship had been torpedoed or at least struck a mine. What really had happened was that one of the twenty-four-foot connecting rods had snapped off about three feet from the crank, acting as a large flail. The piston had gone down through the bottom head and stopped about six inches from the skin of the ship. In less than one-half hour the broken end of the connecting rod was removed from the crank, the valve gear to the port engine disconnected, and after several tries she was induced to carry her center using the starboard engine.

There Are Large Doors on the Top of the Paddle Wheel Boxes for Access to the Wheels. In Heavy Weather These Doors Are Closed and Blows the Air Inside the Paddle Boxes and Blows the Doors Open. A Note from an Old Night Order Book Records One Case.
The Brig Astern Is the "Niagara," Perry's Flagship, as She Is at Present.

It was found that about ten turns could be made which gave the ship a speed of less than five miles per hour.

During the ensuing night a strong summer gale was experienced while crossing Saginaw Bay, which forced the ship to put into Harbor Beach the next noon. After a slow and trying cruise the old warrior made her home port on schedule time and under her own steam.

Whether the *Wolverine* will be repaired has apparently not been decided. Today she lies alongside her dock at Erie in the condition she was in when she made port last fall, but it is to be hoped that the broken connecting rod will be replaced and that future generations on the lakes will try, as four generations have already done, to get the first glimpse of her masts above the horizon when on a calm day they "can hear her paddles chunking" long before the ship itself is visible to the naked eye.

THE SELECTION OF MAN POWER AT ITS SOURCE

By Lieutenant L. W. Bagby, U. S. Navy

INFORMATION has recently been disseminated that in first enlistments of four years, the average length of service is two years and one month. In other words, approximately one-half of the men enlisted in first enlistments serve honorably for the full four years of their contracts. We know where the rest of them go: but why?

There are a number of causes and conditions contributing to the loss of man power, or labor turnover, in a military organization, whose proportionate effects are fairly constant, and which it seems the service in general is inclined to accept philosophically, or at least without a definite idea of counter-action. A compilation of statistics showing totals and percentages of losses due to various causes, if these losses are inevitable, is merely interesting matter to be filed for future reference as to the workings of the laws of choice and chance. But it is not conceivable that we should accept all of them as inevitable, nor that we should make no effort to remedy any condition which may be a contributing cause. It is the purpose of this article to show at least one means whereby some of the potential losses may be eliminated at the source, and the quality of accepted personnel by the same means, brought to a higher average.

Practically every officer who has handled a working force of any sort has formed definite ideas as to the various types that are usually encountered. He has seen the "good man at any job," and the "bum at whatever he tries." These are minority types, and both, so far as we are concerned, accidental, since their qualities are not discovered until after enlistment. The "bum" is the bane of the division officer's existence. His clothing bag miraculously empties itself between inspections, and he has always "never heard of that order." His shortcomings are reflected in

the fitness reports of his superiors. What is the answer? If he has been correctly handled, and does not respond to treatment, that he is a misfit cannot be doubted. A transfer to some other ship or department, which is hardly ethical though often practiced, merely shifts the load to other shoulders, and is no insurance that in the next draft received the story will not be repeated. Desertion or early discharge, the technical loss of a man and the actual loss of a part of the Navy's appropriation, is almost invariably the culmination of this individual's naval career.

The "good man" becomes a petty officer, and rises more or less steadily. A minimum length of service in each rating has been prescribed, based on the normal flow; this minimum is not sufficient barrier to deter the man who is ambitious and to cause him to leave the service. It is merely one of the conditions of advancement, to be fulfilled conscientiously. It is not actually as long as our present *average* man should and does serve before being advanced. We have always with us the vast majority, those whose conduct and work are neither open to criticism nor matter for special commendation. Time only can give us an indication of who are the plodders, the reliable and trust-worthy slow thinkers, and who are the ones with an apparently incurable streak of irresponsibility.

The lost prestige and favor resulting from misconduct that is not traceable to a constitutional defect, (and therefore not likely to be repeated), may be regained by subsequent good behavior. Minor offenses committed early in a man's career do not stamp him as forever unfit. But with all due allowance for the disturbances and adjustments which are a part of the formative period of service, how far short we are of possessing, in the aggregate, that combination of brain and brawn, the ideal "navy standard" man!

There are too many individuals who have not the capacity to grow into the right sort; it is possible that in a few cases they might be redeemed, but in mass training they either trail hopelessly astern or hold the entire organization to a slower pace. A sweeping elimination of the inapt, repeated periodically, would of course result in a higher average ability among those retained in active service; but this is a costly cure, effected by the very means we are trying to prevent: i.e., excessive turnover with its consequent drain on appropriations.

The Navy offers attractions to the man who wishes to learn a trade, but the system quite properly requires that the candidate must qualify. His qualifications may be either demonstrated ability in actual service, or proof of experience and knowledge acquired in similar work prior to enlistment. In general, this principle holds, whether he is detailed as a striker aboard ship or sent to a trade school ashore. The important fact is that he is selected competitively, from material available, to fill a vacancy in a special branch; he is a unit in the disposition of forces, and he must either produce results or drop out. Due care is taken that his selection shall not prove a mistake. It seems no more than reasonable, in selecting for service in the Navy, to exercise the same precautions as in selecting men for special training from those who are already in the Navy.

Until a recent date, we were in the unenviable position of employers taking what we could get, so long as it was a male specimen of legal age and not too decrepit. Recruiting officers demonstrated that the men could be had in whatever numbers desired, if they were actively sought. The enlistment of an applicant depended almost entirely upon two points: the legality of the enlistment, the physical condition of the applicant. Human nature being fallible, mistakes on even these two points were not infrequent.

The authorized strength of the Navy having been attained, the standard for enlistment has been raised in some respects. It is yet too early to judge what the permanent results will be, but there has already been noticed at Great Lakes a diminution in the percentage of underage enlistments and of requests for special order discharge by reason of home conditions. The runaway sons and husbands are disappearing.

We are moving in the right direction, we hope, but we have not yet exhausted the possibilities of the recruiting officer as a judge of character and ability. He is at present charged with the determination of the condition of the candidate's physique, and to some extent his mentality, morality, and temperament. The last two qualities he has not the facilities to decide upon except by reputation, as related by persons who may be as little known to him as is the applicant. The mentality, or intelligence, of the applicant is also determined by reputation. The theory

and contention of the writer is that if satisfactory intelligence can be demonstrated practically before enlistment, the moral average with few exceptions will be high; and with intelligent recruits only to handle, the differences in temperament will not be much of an obstacle in the way of turning out a finished product that will closely approach the desired standard as a limit.

The Bureau of Navigation has adopted the O'Rourke test for general intelligence, to be applied to all trade school candidates as a preliminary to examination in the special branches for which they have applied. Its purpose is, briefly, to find the true age of a man's brain. Being a written test, it requires a modicum of education, and the hopelessly illiterate are automatically weeded out. The minimum requisite amount of schooling having been completed, the result of the test will indicate how much the examinee has expanded in intelligence in the years following, whether he continued in school or not.

To determine, if practicable, how the score made in the test would reflect the character of the individual, the practice was adopted at Great Lakes of applying the O'Rourke test to each recruit received for training, instead of to trade-school candidates only. One interesting and cheering fact was brought to light almost immediately: that a large percentage of the more intelligent preferred to go to sea for general detail rather than enter trade schools. This was diagnosed as being most probably the result of a lack of artificer ratings among the instructors; but it is comforting to feel that there are still men with brains who would rather be deck petty officers than rated technicians.

Comparison has been made between the scores made by recruits received before and after the recruiting officers were advised to revise upward the requirements for enlisting applicants. Of the last hundred men received before the entrance bars were raised, the average score was 58.49. The lowest individual score was 9.0, and the highest 97.0. Of the first hundred received since then, the average score was 59.87. The lowest individual score was 1.0, and the highest 94.0. The recruiting officers are undoubtedly making applicants show better references than were required under the previous system of recruiting, but the personnel is still coming from the same intellectual stratum of society. The average intelligence is not appreciably higher. We can not expect

many college graduates to apply for enlistment. If there is a limit of education from beyond which no one returns to become a recruit, it behooves us to choose those below it who possess the ability and brain-power to have exceeded that limit had they remained in school. We can attain sufficient quantity and still insist on proper quality.

An analysis of all scores made on the test shows, with of course some exceptions, that the score bears a fairly direct ratio to the number of grades completed in school. It is believed that the higher education is the result, not the cause, of the higher intelligence. The near-idiots did not advance in school because they were incapable of so doing. To point to a shining example of real brains, Abraham Lincoln was not intelligent merely because he had absorbed an education; he educated himself by the driving power of his native intelligence.

It was not so long ago that the man who could not even sign his pay receipt, or could do just that and no more, was not at all uncommon in the Navy; and a great many of those unfortunate illiterates were good seamen and gunners, just as there are illiterate mountaineers today who are expert woodsmen and rifle shots. But even the Navy must change, and intelligence that will enable its owner to grasp the details of ship life and duty is more now than an undeniable asset; it is practically an absolute requirement. The efficiency of the bulletin board is seriously impaired when the matter posted can not be read by every man, or if read, is meaningless to many. Literacy has come to stay, and we are several tiers above even that foundation. Official orders and notices, while brief and concise, are not written literally in words of one syllable. It is pitiful to consider, in the light of the O'Rourke test, how many of our recruits are not only still in the one-syllable class, but are not capable of advancement.

We very greatly need a higher order of intelligence. This does not mean flashing brilliancy alone; the slow plodder, provided his mental processes form a logical sequence, still holds his position of desirability. His defect, if it can be properly called a defect, is one of temperament, not of intelligence. The O'Rourke test has sufficient questions and the time allowed is long enough for him to demonstrate his right to a place among the worthy. The unfit, those who could be weeded out, are not the ones who are

merely slow travelers; they are those who have completely and irrevocably stopped at a point below normal.

The uncaught or potential thief of thus far good reputation, recruiting officers are defenseless against, unless it be invariably true that his intelligence is of a low order, which theory has yet to be proved. No claim is made that he would be eliminated by the O'Rourke test, but some of his ilk would undoubtedly fail to pass.

In actual service, we are continually being confronted with the following conditions: One hundred one-man tasks to be accomplished; one hundred men allowed for their accomplishment; an embarrassingly large number of the one hundred men not fit to be entrusted with any one of the hundred tasks.

The smaller the unit of men, the greater the embarrassment if one is a misfit. What a relief it would be to know that every service record in the office represented not only the body of a man, but an adequate controlling brain: that each man in a new draft could be charged with only one fault, lack of naval experience! A long step toward the attainment of this ideal will be selection at the source: that is, the O'Rourke test conscientiously applied before enlistment to every applicant who is physically qualified.

DISCUSSION

Fixing the Decimal Point

(See page 1292, August, 1924, PROCEEDINGS)

CAPTAIN ELLIOT SNOW (CC), U. S. NAVY.—During my day at the U. S. Naval Academy—some forty years ago—we were not told of the existence of a slide rule, nor were we given any instruction in methods of quickly approximating the value of computations, even of the simple kind used in illustrating Lieutenant Commander Green's article. We were, however, taught logarithms after a fashion.

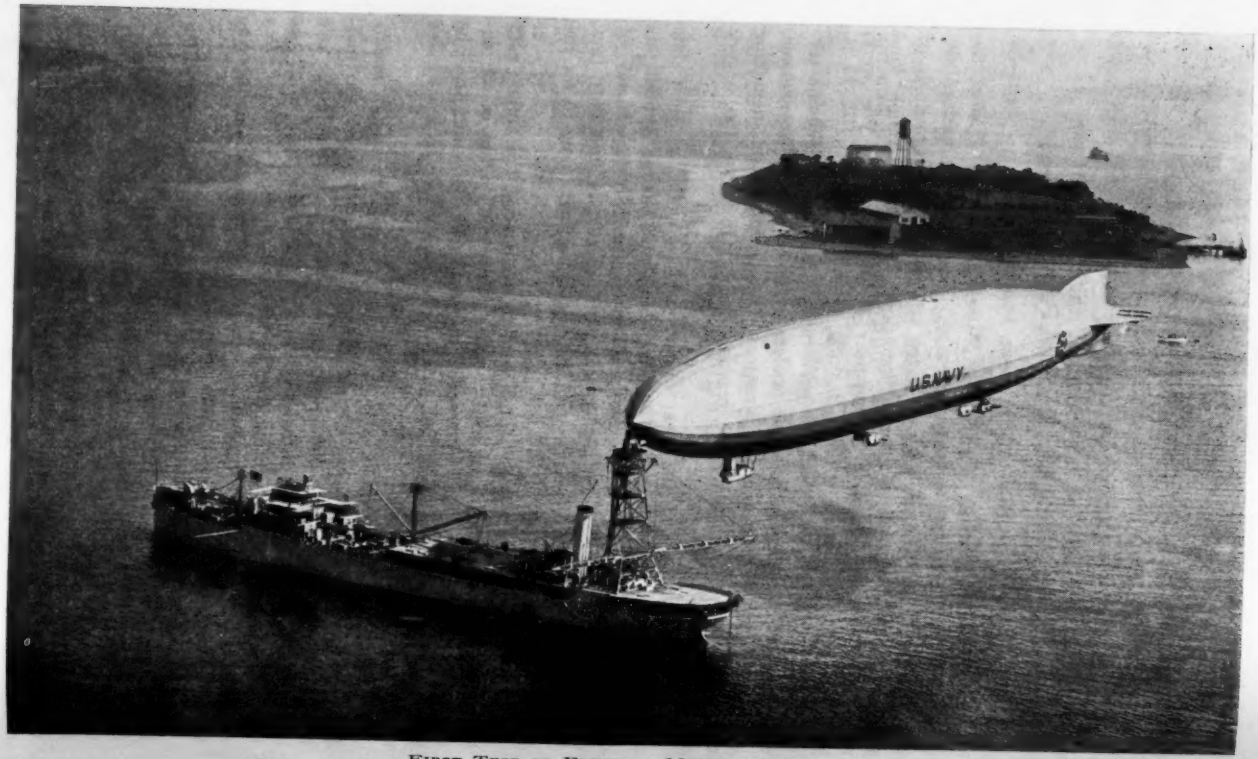
Lieutenant Commander Green has performed a lasting and genuine service to a great many of the younger readers of the Institute PROCEEDINGS, by telling in such simple language how to fix the decimal point in making calculations with a slide rule. The reason for the rule forms, too, a very necessary part of the article.

He has put his finger on the great stumbling block in the use of a slide rule—not knowing how to fix the decimal point—and having pointed this out it is to be hoped that hereafter, teachers at the Naval Academy of the subject of logarithms will include in their instruction, not only how to use a slide rule but in doing so will also explain clearly how to fix the decimal point.

In the rule printed in italics, at the head of page 1294, the author uses the expression "going right across the rule's mid-point." And in the description of the problem which immediately follows on the same page, he uses similar expressions; for example, "so when we divide by 20 we are moving from *right to left.*"

I was puzzled in reading the article, because *a slide rule has no middle point,* and because I could not decide what it is that "crosses the mid-point [toward the] right." Obscure expressions, such as these, are often found in textbooks and make students waste much time in trying to understand them. Fortunately, the article closes with a bit of very sound advice, the sum and substance of which is, "Try it without thinking any further of his explanation or my criticism."

The fact that probably over ninety per cent of the engineering calculations that one meets in every-day practice could be made quickly and with sufficient accuracy, using a 10-inch slide rule, is sufficient in itself to justify imposing the requirement on midshipmen that slide rules be customarily used when solving problems. This practice, if consistently followed, and if coupled with a short, lucidly explained course in "Precision of Measurements," will go a long way toward saving a great deal of valuable time.



First Test of Floating Mooring Mast

PROFESSIONAL NOTES

PREPARED BY

LIEUTENANT COMMANDER H. B. HIRD, U. S. NAVY

GENERAL ARRANGEMENT

VESSELS BUILDING, NAVAL POLICY, MATÉRIEL, PERSONNEL	Great Britain	1703
	France	1714
	Germany	1718
	Japan	1721
	United States	1724
MERCHANT MARINE		1731
ENGINEERING		1732
AERONAUTICS		1739
ORDNANCE		1743
NAVIGATION AND RADIO		1748
MISCELLANEOUS		1752
CURRENT NAVAL AND PROFESSIONAL PAPERS		1764

GREAT BRITAIN

British Naval Review Shows Old Fleet Gone

By Hector C. Bywater, Baltimore *Sun*, 30 July, 1924.—Preparations begin this week for the grand naval pageant at Spithead on July 26, when King George is to review the British fleet stationed in home waters. The event will be something in the nature of a national holiday. Enormous crowds are expected to attend, for London just now is full to overflowing with visitors—provincials, colonials and foreigners—who have been attracted to the British metropolis by the Wembly Empire Exposition and the many social functions of a season which is proving to be one of extraordinary brilliance.

Thus the gathering of warships at Spithead may be regarded merely as part of the vacation program and not as an event to which any special significance attaches. There are to be illuminations and searchlight displays; the ships are to be thrown open to the public and the crews will even be permitted to entertain their friends on board.

The thoughts of many who witness this spectacle will turn back to that fateful summer of 1914 when another great fleet gathered at Spithead for review by the King, but under what different circumstances! In March of that year Winston Churchill, then First Lord of the Admiralty, had announced that in place of the customary annual grand maneuvers a test mobilization of the Royal Fleet Reserve would take place in the forthcoming summer.

The purpose of this was to determine the readiness for war and general efficiency of the second line fleet, which in case of emergency would have to reinforce the fully commissioned squadrons of the navy. Mobilization of these older ships involved the calling up of thousands of reservists, the overhauling of the vessels themselves and their equipment with fuel and stores, all of which occupied much time. Plenty of notice had been given, however, and when the reserve ships steamed up the Solent on July 18

and fell into line with the rest of the fleet they were all more or less ready for active service.

In view of what followed, German writers have charged this country with having deliberately prepared for the World War, since it was able at the critical moment to throw the whole of its naval strength into the scales, but there is no truth in the allegation. The mobilization of the reserve fleet was a pure, albeit a most fortunate, coincidence. Conclusive evidence on this head is furnished by Churchill in his book, *The World Crisis.* No doubt the fact of Germany's going to war just six weeks after the opening of the widened Kiel Canal—which added enormously to the strategic power of her fleet—was an equally fortuitous circumstance.

No one who was present at Spithead during the week of July 15-20, 1914, is ever likely to forget the scene. It was by far the greatest assemblage of combatant ships which had ever taken place in England or elsewhere. The capital ships alone occupied many lines, each with a length of several miles. As far as the eye could reach there were dreadnaughts, battle cruisers, pre-dreadnaught battleships, armored and light cruisers, destroyers, torpedo boats, submarines and depot ships.

The only absentees were ships on foreign service and a few old crocks not worth commissioning. Otherwise, virtually the whole might of the British Navy was concentrated in this tremendous armada, but, despite the presence of many visitors, the display of bunting, the salutes and the gay pleasure steamers darting to and fro, there was something in the atmosphere that effectually quenched the holiday spirit.

Ominous clouds, patent to all save the willfully blind, were darkening the political horizon. Less than a month before, the fatal shots had been fired at Sarajevo. News of the murder of the Austrian heir-presumptive and his consort on June 28 had reached Germany while a British battle squadron lay at Kiel. Three days previously the Kaiser had boarded the battleship *King George V,* which hoisted his flag as admiral-of-the-fleet of the Royal Navy. When leaving Kiel on June 30 Admiral Warrender, commanding the British squadron, sent a radio message to the German fleet: "Friends in the past, and friends forever." Five weeks later the two fleets were engaged in deadly combat, each seeking the other's destruction.

On July 20 the naval pageant at Spithead came to an end. Led by King George in his yacht, the fleets weighed and steamed out to sea for tactical exercise. These lasted five days, after which the squadrons returned to Portland, anchoring there on July 25—the very day upon which Austria's provocative forty-eight hour ultimatum to Serbia was to expire.

Relations between Russia and Austria had meanwhile reached a state of acute tension. An explosion seemed imminent. Germany's attitude was still uncertain but the chances of localizing the impending conflict were remote. At this time the orders for the dispersal of the fleet at Portland had not been revoked, since the Foreign Office was particularly desirious of avoiding any move that savored of menacing action. In a few more days the squadrons would be widely separated, the reserve ships de-commissioned, and the advantage gained by the mobilization would have been irretrievably lost.

What happened next is still to some extent shrouded in mystery. Suddenly, on July 26, the process of dispersal was stopped by a telegram from the admiralty, which ordered the commander-in-chief, Admiral Callaghan, to keep his forces intact. This timely order is said to have been dispatched on the initiative of Winston Churchill, but some accounts attribute it to the late Admiral Prince Louis of Battenberg, who, as first sea lord, was Churchill's subordinate.

Two days of anxiety ensued. All naval leave was stopped; ships away refitting were ordered to rejoin their stations at once; ammunition and war stores were pouring into the ships and everything was being put in readiness

for a state of war. At dusk on July 28 Portland roadstead was teeming with ships: at dawn on the twenty-ninth it was practically deserted, for the first fleet had quietly departed for its base "in the northern mists," where it was destined to remain upward of four years.

In those days the German Navy was supposed to be imbued with a bold offensive spirit. Immediately war became certain it would, we were told, infallibly attempt some daring stroke against the British fleet, probably by means of its torpedo flotillas, which were known to be numerous and skillfully handled. If that succeeded, the German battleships would forthwith sally out to fight a decisive action for the command of the sea.

With this possibility in mind the British war plans had laid down that the fleet, when proceeding to its base at Scapa Flow, should go west-about—that is, through the Irish Sea and round the west coast of England and Scotland, but when the route came to be settled on July 28 it was decided, in order to save, to send the ships by the direct course up the Channel and the North Sea, taking the chance of a German torpedo attack on the way.

This was done and the fleet steamed through the Strait of Dover at night in battle formation, without lights, and then up the middle of the North Sea, arriving at Scapa without having seen more than the distant funnel smoke of a German cruiser. In this wise the effective battle squadrons of the British Navy were ready and waiting at their war posts when the storm broke over Europe a few days later.

As a matter of fact, Britain was to have another month in which to complete her naval dispositions, for all that time the German fleet, so far from taking the offensive, busied itself with strengthening the defenses of the Heligoland Bight. "No risk must be taken" ran the Kaiser's order to his fleet, and implicitly was it obeyed. With the exception of two or three submarines, which made short cruises without achieving anything, no unit of the German Navy was allowed to put to sea for more than a month after the outbreak of war. The surprising inaction on the enemy's part was probably more embarrassing to British war plans than a prompt attack by the united German fleet would have been.

The naval review at Spithead next week will take place under happier auspices. While the political situation in Europe is not without elements of anxiety, or even of danger, there is fortunately no reason to anticipate any immediate menace to the *Pax Britanica*. Moreover, the British Navy of today, though but a skeleton of the gigantic organism of ten years ago, is far more powerful relatively than its predecessor was.

Its erstwhile formidable competitor, the German fleet, has ceased to exist and there is nothing to take its place. France is building a new fleet of mosquito craft but she has only half a dozen big ships of modern design. Signor Mussolini's plans for the creation of a great Italian fleet are still in the paper stage and Russia, whose pre-war navy was a fact to be reckoned with, now has scarcely one effective man-of-war. In Europe, therefore, the British Navy enjoys absolute supremacy.

Only one of the battleships that took part in the 1914 review will be present at Spithead for the coming show. All the rest have gone, mostly to the ship-breaker, though not a few were lost in the war. The same is true of the other types—light cruisers, destroyers and submarines—now in service, all those now in commission having been completed since 1914. The total disappearance of that vast fleet which paraded in all its pride and majesty just ten years ago reminds us how brief is the life of the modern warships, which costs many millions to build and yet may be ripe for the junk pile within a few years of its completion.

Policy and Armaments

Army, Navy and Air Force Gazette, 2 August, 1924.—A debate in the House of Lords last week on the Treaty of Mutual Assistance called forth an illuminating speech from Lord Balfour. The sentence in it which seems to us of special importance is that in which he declared that if all the signatories to the Covenant of the League of Nations acted in the spirit of that Covenant, there would be no war and no danger of war. It is a very big "if," but there can be no gainsaying its importance. Certainly, this country has nothing with which it can reproach itself in this respect, for we set an example of disarmament to the world long before the Washington pact was thought of, and by our actions since, culminating in the postponement of the Singapore base, we have given evidence of a desire to try fully a policy of conciliation as distinct from one of sturdy independence. All armaments depend upon policy and are the outcome of policy, and anyone who examines the decline of British armaments during the past four years can have no doubt as to the sincerity of our policy.

But everything depends upon whether that policy succeeds. It would be suicidal to pursue it in the absence of a response from other nations. We all agree with Lord Balfour about the results which would accrue if all the signatories to the Covenant of the League applied its principles in full, but the course we are bound to adopt when we find little or no evidence of this is that laid down by the Prime Minister recently in his speech at Cymmer, when he declared that it was not his conception of disarmament that one nation should throw up its arms and say, "We are not protected and you can do as you like." His conception, and it is shared by the nation, is that we are bound to keep a minimum of forces going until such time as a complete understanding has been reached.

Lord Balfour is hopeful that "the disarmament for which people long will come gradually as the nations realize that the burden their armaments place on them is not worth while to bear." Viewed from the detached standpoint of a world onlooker, this is all very well, but applied to the realities of life it is apt to become a dangerous doctrine. There are few more misleading phrases than that about the "burden of armaments." All burdens are relative, and the cost of preparation for defense is as nothing compared to the burden of war or the risk of unpreparedness. If ever our people really come to regard this necessary provision as not worth while they will be heading straight for the dissolution of the empire.

The "Standardized" Light Cruiser

The Engineer, 25 July, 1924.—In the course of the year five cruisers of the new *County* class are to be laid down for the Royal Navy. According to official statements in Parliament, they will conform in size and armament to the type standardized by the Washington Treaty; that is to say, they will displace about 10,000 tons and carry guns of 8-inch caliber. Ships of the same general type are already being built or are projected for the navies of the other treaty powers. Japan has begun work on the *Myoko,* and between now and the end of next year will lay down three further units of that class. Of 10,000 tons displacement, they are reported to have machinery developing 120,000 shaft horsepower and will mount eight 8-inch guns in twin turrets. Four smaller ships are already under construction in Japan: viz., *Kako, Furutaka, Kinugasa,* and *Aoba.* In them the displacement is limited to 7,100 tons. No machinery details are available, but it is known that the ships will have the very powerful armament of six 8-inch guns. The French program provides for the construction of six 10,000-ton cruisers during the next few years, an armament of eight 8-inch guns being indicated. Italy is laying down this year the cruisers *Triest* and *Tarent,* also

of 10,000 tons, but in conformity with Italian tradition the gun power of these vessels will be very formidable in proportion to their size, each mounting ten 8-inch guns in two triple and two twin turrets. Finally, the American Navy Bill, which has not yet become law, authorizes the construction of eight cruisers, to displace 10,000 tons apiece and to have eight 8-inch guns.

In view of the restriction on tonnage, the high speed which will certainly be aimed at, and the considerable weight alloted to armament, it will be difficult, if not impossible, to equip any of these vessels with side armor strong enough to resist projectiles even of medium caliber. Their protection is therefore likely to resemble that of most of the fast cruisers now in service, which are plated amidships with three-inch high-tensile steel, in addition to one and one-half inch protective decks over the machinery and other vulnerable parts. When this system came into vogue, the 6-inch gun was the heaviest piece carried by foreign ships of recent date, and against shells of this caliber the combination of three-inch side armor with decks of the given thickness was doubtless reasonably effective; but with the universal adoption of the 8-inch gun, which is now impending, the new cruisers will need some stouter form of protection if they are not to be exposed to damaging hits, even at long range. The problem of how to confer such protection without unduly sacrificing armament or speed is one that will tax ingenuity of naval constructors to the utmost; in fact, we do not see how it can be solved on a really satisfactory basis. If the naval demand for speed and hitting power is to be met—say, 33 knots and eight 8-inch guns—there will be very little margin left for armor. Probably therefore ships built on the *Washington* model will be deficient in resistance to gunfire, a failing which will compel them to fight at long range, especially as their high-velocity 8-inch guns should be effective up to maximum visibility. It is not altogether a misfortune, from our point of view, that cruisers of the new type should be too costly to permit of their rapid multiplication. If foreign navies were able to build them in large numbers, our present fleet of cruising ships would soon become obselete, consisting, as it does, for the most part of ships under 5,000 tons, which mount nothing heavier than the 6-inch gun. For the time being we have only four craft which, in size and power, come within measurable distance of the *Washington* standard. They are the *Hawkins, Vindictive, Frobisher* and *Effingham,* of 9,750 tons, mounting seven 7.5-inch guns apiece. The first two having machinery developing 60,000 shaft horsepower for a speed of 30 knots. In the second pair the figures are increased to 70,000 shaft horsepower and 31 knots. These ships were notable for the re-introduction of the 7.5-inch gun, which had been in abeyance for about twelve years previous to their laying down. It was a caliber unknown in the British Navy until we acquired from Chili in 1903 the two battleships *Swiftsure* and *Triumph,* each of which carried fourteen 7.5-inch guns in the secondary battery. Apparently it gave satisfaction, for guns of the same caliber were selected to arm the later *County* cruisers, and subsequently the heavier ships of the *Warrior* and *Defense* class. It had a high rate of fire and good armor-piercing properties, besides a considerably longer range than the 6-inch, which had hitherto been deemed the cruiser gun *par excellence.* The Vickers model 7.5-inch 50-caliber piece, built in 1902, proved capable of firing five aimed rounds in thirty-one seconds, equivalent to eight rounds a minute. The most powerful mark of this caliber now listed in the Elswick ordnance tables has a muzzle velocity of 3,000 foot-seconds and can be worked at the rate of six rounds a minute. All British 7.5-inch guns fire a projectile weighing 200 pounds. Weapons of this weight and power should have sufficed, one would imagine, for most of the tactical requirements a cruiser is expected to fulfil. At the same time we are inclined to think the Admiralty has done well to select 8-inch

guns for the new cruisers, seeing that so many ships now being built or projected abroad are designed for that armament. It is an old-established and very sound principle in the British Navy to build only such ships as shall be equal in fighting power to contemporary foreign craft of a similar class. Thus, when the Washington Conference agreed to restrict the armament of future capital ships to 16-inch guns, and that of future cruisers to 8-inch guns, it followed, almost as a matter of course, that the next vessels laid down for the British Navy would be armed in accordance with this ruling, despite the fact that both calibers were new to our service. It is close upon forty years since British ships armed with 8-inch breech-loading guns were built. They were the four protected cruisers, *Forth, Mersey, Severn,* and *Thames,* launched in 1885-86. They were of 4,050 tons displacement, with a speed of 16½ to 17 knots. Each mounted an 8-inch fifteen-ton gun at the bow and stern, with ten 6-inch on the broadside. The big gun weighed fifteen tons, it had a length of 29.6 calibers, and its 210 pound projectile, endowed with a muzzle velocity of 2150 foot-seconds, was capable of perforating fourteen and one-half inches of wrought iron at 2,000 yards range. It was, therefore, a weapon of formidable power for those days, but for some reason it failed to win popularity, no other vessels being armed with it. Several years later an improved 8-inch model, built on the quick-firing system, came into favor with certain foreign navies and formed the main armament of many cruisers constructed in England for the South American Republics and Japan. Many United States cruisers were also armed with guns of the same caliber. While there are, of course, no details to hand of the 8-inch guns with which our new cruisers are to be equipped, various models of this caliber appear in the ordnance lists published by two of the great British manufacturing firms. Vickers Limited show an 8-inch gun of 48.52 calibers, weighing only fourteen tons three hundred weight, or less than the standard 7.5-inch mark. The projectile of 247.4 pounds has a muzzle velocity of 3,000 foot-seconds. Sir W. G. Armstrong, Whitworth and Company list two marks of 8-inch gun, 45 and 50 calibers respectively, both discharging 250 pound shell. The first gun weighs eighteen tons, the second 20.4 tons; the respective muzzle velocities are 2,845 and 3,000 foot-seconds.

Exceptionally powerful broadside fire in proportion to displacement promises to be the most striking feature of cruisers built to the *Washington* standard. If a 10,000-ton ship of this type is armed, as it probably will be, with eight 8-inch guns, it will discharge at each full broadside 2,000 pounds of metal. Assuming four aimed rounds per minute to be the probable rate of fire in action, the ship would be hurling more than three and one-half tons of shell at the target every minute, a volume of fire greatly exceeding that of which the average pre-*Dreadnaught* battleship was capable. Cruisers of this hard-hitting type seem to be cast for a leading rôle in the naval wars of the future. Upon them will fall the brunt of the surface fighting, since the capital ships, limited in number and impossible to replace, will be too valuable to be risked, save in the last resort. If the Admiralty's construction program is maintained by successive governments, fifty cruisers of the 10,000-ton class will be built during the next ten years. This scheme, however, makes no allowance for any sudden expansion which the cruising fleet of a foreign Power may undergo in the interim. Our building policy must be governed, as heretofore, by the concurrent development of other navies. To defend our vast floating trade, we require, and probably shall always require, a large fleet of ocean cruisers, not inferior, ship for ship, to the best types serving under other flags. Thanks to the Washington Treaty, we need apprehend no revival of that frenzied competition in tons and guns which developed in the closing years of the last century between this country on the one hand and France and Russia on the other, and led

to the building of monster cruisers which gave no adequate return in fighting power for the high cost of their construction and maintenance. The five principal naval powers have mutually agreed to accept a limit of 10,000 tons displacement and 8-inch guns for all the new cruisers they may lay down so long as the treaty remains in force. The effect of this agreement may be two-fold. In the first place, no power is likely to build ships of smaller size and lighter armament, which would be bad investments from every point of view; secondly, the cost of the standard cruiser will be heavy enough—£2,000,000 or more—to deter any nation, even the wealthiest, from embarking on a program larger than its requirements urgently demand.

Treaties of Security Opposed by M'Donald

By H. Wilson Harris, *Baltimore Sun*, London, 19 July, 1924.—While the Allied Conference in London is trying to solve the problem of reparations Europe as a whole is still facing the problem of how to make itself safe for democracy. The two questions are in some degree linked, for if Germany and the Allies can come to terms on reparations, and the Dawes report be put seriously into operation, one of the chief causes of insecurity and instability in Western Europe will have been to a large extent disposed of; but, viewing the situation broadly, we have to face the regrettable fact that the security issue throughout the Continent has yet to be dealt with in earnest.

That issue is really twofold, for you cannot separate security and disarmament. Whatever may be thought of the details of the draft treaty of mutual assistance now before the League of Nations, there is no contesting the soundness of its main thesis—that it is useless to endeavor to persuade nations to disarm unless you can guarantee them in some other way the security they believe their armaments to confer. To that contention there is indeed one answer. So far as Europe, at any rate, is concerned, it may possibly be argued that the direct approach to the security and disarmament problem is not the best one, that the key of the situation is general confidence, and that that confidence will be created, and is in fact being created, as the League of Nations grows to increasing strength.

There is something to be said for that theory. There is no doubt that the league has already done something to diminish the sense of insecurity in Europe. By its Austrian and Hungarian reconstruction schemes it has vastly diminished the prospects of war in that particular quarter of the Continent—and a war in the central region would inevitably spread east and west and south and north. Every time a dispute is settled by the Permanent Court at The Hague or by the council of the league at Geneva a new demonstration is given of the existence of an effective alternative to war as a method of settling differences between nations. The periodical meetings of the council and the assembly are opportunities for the general discussion by a dispassionate body of any situation that seems to menace the peace of the world.

All that is true enough, but it would be foolish to exaggerate what the league has done or could do in less than five years from the day of its birth. It has begun. It is succeeding. But to leave the problem of armaments and security to solve itself as a kind of secondary result of the league's normal operations is to expose Europe, for perhaps a generation, to the danger of another outbreak more fatally disastrous than the last.

At the present moment the outlook is frankly depressing. The Allies are in conference in London, discussing primarily the problem of reparations. They may get the Dawes report adopted, but everyone knows that for France the real question is not reparations at all, but security. Ramsay McDonald knows that well enough, for he sent to Paris weeks ago to have the situation sounded out, and the answer brought back was that without a

solution of the security problem there could be no real agreement with France. The Prime Minister has recognized this in speeches in the House of Commons, and, discussing security, has given it as his view that the only way to deal with the question is by means of a general pact concluded under the auspices of the League of Nations.

That is a perfectly sound and reasonable view and it makes the Prime Minister's decision regarding the draft treaty of mutual assistance the more remarkable. Whatever he said of that document, it is the only concrete plan of disarmament before the world. At the coming assembly of the league it was to be, and still will be, the main subject of discussion. It meets the needs of the French, and, so far as they are concerned, is the only acceptable alternative to that direct guarantee of their frontiers which Great Britain and America first offered and then withdrew in 1919. It equally meets the needs of the Little Entente, and Dr. Benes is one of its strongest defenders. The treaty is undoubtedly open to criticism on many points, but most people who would be unwilling to accept it as it stands see in it, at any rate, a foundation on which some really serviceable agreement could be based.

That being so, the wholesale character of Mr. MacDonald's rejection is disquieting. The causes of it need not perhaps be examined too closely. In the main the government's action appears to have been dictated by two curiously assorted forces which are playing a large part in its decisions. These are the pacifist elements in the Cabinet and the permanent officials in Whitehall.

The power of the latter is greater than ever before. Labor Ministers are inexperienced, and the intrenched official in almost every department is the real master of the situation. Officials in the main are not friendly to the league or to anything which varies from the appointed traditions they inherited when they entered the service. At the War Office there is, naturally enough, a profound belief in armies, and at the Admiralty a belief equally profound in fleets.

The government's expert advisers, therefore, are likely to be searching critics of any plan for reducing armies and navies. They have found plenty of holes to pick in the proposed agreement, while the pacifists in the Cabinet, conspicuous among them Lord Parmoor, the British representative on the league council, are against the draft treaty because they are out for abolition of war altogether, and a project which contemplates in the last resort the use of force against a disturber of international peace commends itself to them very little.

For these, and possibly other reasons, the British Government has given what may well be the *coup de grâcé* to the treaty of mutual assistance. That is a grave step to have taken, and it may mean that the whole life is taken out of the forthcoming league asembly, for a treaty of mutual assistance, from which Great Britain and her dominions stood aloof would be useless to France or any other European power.

If it were a question of reasoned criticism, directed toward an amendment, however wholesale, of the treaty the attitude adopted would be reasonable, but what the British note amounts to is wholesale rejection. That means that the whole security problem is back in the melting pot again and the particular security problem in which France is specially concerned will have to be thrashed out once more from the beginning and, until that particular problem is solved, it will be idle to look for settlement in Western Europe.

We have, therefore, for the moment taken a step backward. Whether it is merely the preliminary to a more considerable step forward remains to be seen. The Prime Minister has, of course, proposed a general disarmament conference. That suggestion arouses considerable misgivings. The Washington gathering in 1921-22 is no real precedent for a conference to handle the whole vast problem of land armaments. To tackle a question

of such magnitude adequately nothing less than a permanent organization like the league will suffice.

Mr. MacDonald, no doubt, believes he is destroying in order to construct. If his attempt at construction fails, as well it may, he will have incurred a grave responsibility.

The New Flying Cruiser

Naval and Military Record, 23 July, 1924.—Such details as have been published regarding the new flying cruiser which has been taken over by the Air Ministry, and is about to carry out tests at Felixstowe, serve to illustrate the remarkable growth of the "heavier-than-air" machine. From wing-tip to wing-tip this latest marine plane measures 200 feet. The hull of it is built in one piece from stem to stern, and it has been designed with a sheer which will enable it to take off or alight in tolerably rough water.

The new air cruiser is intended to operate with the fleet, independent of any aircraft-carrier, and it can carry sufficient stores and provisions to keep going for twenty days. Habitability is provided for a crew of six. The armament consists of machine-guns mounted in the wings and in the stern, and the craft will carry a large number of bombs. The hull is well protected, although in such a manner as not to interfere with resiliance. For sea-cruising an ordinary marine motor is fitted, which will give the craft sufficient speed upon the water to enable her to conform to the evolutions of a warship squadron. Of course, if she has to do continual flying she will have to replenish her petrol tanks and arrangements will be made to enable her to do this from one of the ships of the squadron to which she is attached.

Singapore Again

Naval and Military Record, 23 July, 1924.—The debate in the House of Lords last week raised by Lord Linlithgow's question as to whether the government intended to reconsider their decision on the subject of Singapore, resulted in the laying down of a rather remarkable doctrine on the part of the Lord Chancellor. Admitting that, so far as any international agreement is concerned, we are quite at liberty to proceed with the Singapore base, Lord Haldane justified the policy of abandonment on the grounds that "it would dominate the Pacific and its purposes would be more offensive than defensive." Although the Chancellor has been Secretary of State for War, he appears to have a most nebulous idea of elementary strategic principles.

It is for the very reason that Singapore would dominate the Pacific (although in a much more qualified degree than Lord Haldane intended to imply) that its possession is so important in the general scheme of Empire defense. Every weapon in the armory of a fighting organization is offensive as well as defensive. The Singapore scheme is not aimed at any particular power. If any particular power strongly objects to it (as Lord Haldane's statement would seem to suggest), it is reasonable to assume that this can only be the case because it conflicts with that particular power's own outlook upon the future. Had the Lord Chancellor set himself deliberately to "damn with faint praise," he would not have neutralized his attempts to vindicate the government more successfully.

Lord Balfour, during this important debate, put into crisp expression what a great many people are nowadays thinking. Singapore, he said, was outside the Washington Agreement. Why, then, should we bring foreign nations into a matter which concerns ourselves only Just so! If we are to be logical in this new solicitude about the susceptibilities of other nations, we may as well go out of business altogether as a naval power. The British Navy is the greatest offensive, as well as defensive, force in the world, but, beyond a few American politicians, the world shows no resent-

ment at the fact. Everybody in this country wants peace. We are not going to assure it by grand-motherly sentiment.

Singapore is a British possession. It has long been a British naval base. To develop it upon a scale commensurate with present-day requirements, in view of the new orientation of sea power, is but a common-sense step. As the scheme was not designed as a response to any other nation, it is not the business of any other nation. Authoritative naval opinion in the United States is practically unanimous in proclaiming that Singapore is a vital key in our strategic chain. Japan may or may not approve of it, but, presuming she dissented, an additional argument would be added to the sufficiently convincing list for proceeding with the undertaking. Ten years ago the whole of the civilized world plunged into war. Are we really asked to believe that human nature has radically changed in a single decade?

Britain Protests U. S. Gun Elevation

Washington Star.—London, 30 July, 1924.—The British Government has made representations to the government of the United States and Japan that the alteration of the elevations of guns on capital war vessels or expenditures for the purpose of increasing the radius of action of these guns would be, in the opinion of the British Government, a breach of the Washington Convention.

This declaration was made in the House of Commons today by Arthur Ponsonby, undersecretary for foreign affairs, in answer to a questioner who asked whether any representation on this point had been made to any of the signatories of the Washington Convention.

Great Britain's representations against the ship modernization program of the American Navy may bring to a head at last a controversy that has stirred naval circles here almost continuously since the adjournment of the arms conference.

State Department officials declined today to comment on the London announcement of the British move or to indicate what the policy of this government would be. They gave the impression that the question was one of such importance that a very careful study of the whole subject would be necessary before the United States made its reply to London.

In some quarters it was regarded as unlikely that any decision would be made before the return from Europe of Secretary Hughes and conference between him and President Coolidge. Mr. Hughes personally conducted the work of the American delegation at the Washington Conference, upon whose findings the British representations are based.

A ship modernization program, including a change in elevation of the main batteries of first-line warships, was recommended to Congress by President Harding in December, 1922. In an accompanying memorandum, Secretary Denby declared the work proposed was of "major and vital importance" in national defense, and it was pointed out by naval officers during consideration of the question in Congress that many of the first-line British fighting ships already had gun ranges comparable to those requested for the American Navy.

The appropriation asked for was granted, but objections of an informal character came from British quarters, and in April of last year the Navy Department announced that the modernization program would be deferred for the time being. At the same time it was reiterated that navy officials did not regard the proposed alterations as a violation of the Washington Treaty and that the delay was due only to a belief that Congress in appropriating $6,500,000 to carry out the gun elevation project might have acted under misapprehension.

So that all the facts might be developed, an intensive study of the whole

subject was ordered last summer and, as a result, Secretary Denby renewed in his usual report last December the recommendation for a gun elevation appropriation, which he declared "will not in any way contravene the spirit or letter of the treaty." Accompanying the Secretary's report was a statement by Captain F. H. Schofield of the navy general board supporting that view.

"The public is very generally under the impression," said Captain Schofield's statement, "that the British Admiralty has stated officially that by their interpretation of the treaty it would be illegal for us to change the elevations as proposed. No such contention has ever been put forward by the British Admiralty, the British Government or any official of any government signatory to the treaty.

"The general intent of the treaty was to grant each power the full right to keep step with material and scientific progress, subject only to specific limitations. Nowhere is there to be found a 'spirit' of the treaty which contravenes this right."

This statement was accepted in Congress as representing the mature judgment of the general board, after careful study. The House, after a sharp fight, however, eliminated from the bill the item for gun elevation, but if there has been since then any change in the Navy Department's policy, or in the attitude of the administration, nothing on the surface has revealed it.

The section of the Washington Treaty under which the British contention would have to be raised is part three, which deals with the rules for replacement of capital ships in accordance with the replacement tables elsewhere provided. In this part occurs the statement that no retained capital ships shall be reconstructed except for the purpose of providing means of defense against air and submarine attacks. Rules to govern such reconstruction follow and the concluding sentence of this paragraph reads:

"No alterations in side armor, in caliber, number or general type of mounting of main armament shall be permitted except: (1) In the case of France and Italy, which countries within the limits allowed for bulge (elsewhere provided for in the treaty) may increase their armor protection and the caliber of guns now carried on their existing capital ships so as not to exceed sixteen inches (406 milimeters), and (2) the British Empire shall be permitted to complete, in the case of the *Renown*, the alterations to armor which have already been commenced, but temporarily suspended."

The Navy Department proposals for changes in the older capital ships included modernization for protection against aircraft and submarine attack, as well as proposals to alter the elevations of the main battery guns so as to permit these guns to be effective at ranges of 25,000 to 30,000 yards, demonstrated in the war to be possible ranges of combat under certain conditions.

The British viewpoint on the question of gun elevation has been before the Washington Government for some time, but no hint of it has been permitted to reach the public. Significance may attach to this circumstance as indicating that the Washington Government does not regard as serious the situation created by the British interpretation of the treaty.

Officials who have kept in touch with the matter seem satisfied that neither the Japanese nor the French Governments, and probably not the Italian Government, would share the views expressed by the British if the question ever came to a vote among the signatory powers. They believe that the British would be outvoted 4-1.

There is no specific provision in the treaty detailing how a disputed interpretation of its terms might be settled, but it is provided that during the life of the treaty, in the event that "the requirements of the national security of any contracting power in respect of naval defense are, in the opinion of that power, materially affected by any change of circumstances,

the contracting powers will, at the request of such power, meet in conference with a view to the reconsideration of the provisions of the treaty and its amendment by mutual agreement."

A further provision is made that the United States, after consultation with the other powers, shall arrange for a future conference "in view of possible technical and scientific developments," the conference to convene as soon as possible after the expiration of eight years from the coming into force of the present treaty.

So far as known, however, the British have not proposed any new conference on the gun-elevation question.

FRANCE

Naval Outlook

By J. B. Gautreau, *Naval and Military Record,* 16 July, 1924.—The 2,400-ton *Leopard* and *Chacal* are ready for launching at St. Nazaire and the two other destroyers of the series will also be floated in the summer. The present year will be a record one in the matter of naval launches. Preparations are being made to commence at Brest and Lorient the 10,000-ton *Cassard* and *Primauguet.*

American offers for a further limitation of armaments come at the wrong time. Germany's open preparations for *revanche* and threats, Italian armaments, especially in the air, and the enormous unprecedented superiority of the British Fleet show the time has not come for peaceful France to further disarm.

With the completion at Lorient of the modernization of the *Voltaire,* Rear Admiral Docteur will have under his orders in perfect fighting trim the three old battleships *Voltaire, Diderot,* and *Condorcet,* that belonged to the 1906 program and have been in constant service for the last fifteen years. The *Danton,* of the same series, sank in the Mediterranean after being hit by two torpedoes. The *Voltaire* was torpedoed twice off Milo in 1918, and sustained only minor damages. That remarkable immunity was due to the elastic wood-sheathing with which she had been coated, and especially to the longitudinal *cassion* (internal bulge) that protects those ships against submarine explosions. It is reckoned that those *caissons,* elaborately improved and developed since the war, render the three *Voltaires* to a certain extent immune against submarine explosions: a capital asset for ships intended to play the rôle of *Garde-côtes* and to fight in areas likely to be infested with mines.

The *Voltaires,* contemporary to the *Dreadnaught* and to other British and American ships long discarded, of course, cut a very poor figure when compared with the 15-inch gun battleships of the English Atlantic Fleet, but it must be remembered that they are not meant for *bataille d'escadre,* and their true worth is not measured by their weight of broadside. They are merely part of the French Northern Coastal organization, serve as mother ships to destroyer and submarine flotillas and never put to sea without their escort of *Torpilleurs* and *sousmarins.* Their numerous armament (four 12-inch and sixteen 9.4-inch guns, with shells of 440 and 220 kilos) makes them excellent cruiser-destroyers—provided enemy cruisers and flotilla leaders be kind enough to come within range. Under cover of flotillas and long range shore batteries, they could move safely along the coast and oppose landings or bombardments (at least if previous notice were given), especially as they see a considerable amount of night training.

Similarly, the 900-ton so-called *torpilleurs d'escarde* of the Brest flotillas make a rather poor show side by side with the standard English and American destroyers in commission, and would have no chance in destroyer actions, but it must be remembered that they are trained for torpedo work

in cooperation with coast guardships, submarines, and seaplanes; and their efficiency is such that they would prove dangerous by night to any hostile force passing within range of the French coasts.

In truth, many specialists of the torpedo branch find them too large for torpedo work and far too visible and vulnerable, and favor a return to the *torpilleur de haute mer* of some 200 tons and 30 knots of the slightly enlarged *Cyclône* type. Admiral de Laperère had much esteem for those boats and delighted to put his flag in them when Prefet Maritime at Brest. In this direction, however, others see the best solution to the surface torpedo-boat problem in those coastal motor boats the designs of which originated both in Great Britain and in France (*bateau-torpille* of Count Récopé), that during the war did such splendid work in the Adriatic and the Baltic under lion-hearted British and Italian commanders. No doubt ocean waters, especially those in the stormy Bay of Biscay, would require larger size and a more robust standard of construction than boats used in narrow inland seas, but the experience gained with the American anti-submarine vedettes, that were able to cross the Atlantic, despite their diminutive dimensions, is considered a proof that something quite satisfactory could be done in that line with a view to strengthening the Brittany *defenses-mobiles* with swarms of fast and practically invulnerable coastal motor boats with a few hundred miles radius of action, that might prove effective torpedo-boats while being also able to render services as anti-submarine and anti-mining craft.

Inventive genius without *esprit de suite* is of little use, as is shown by the history of the Republican Navy. Mosquito warfare had been foreseen forty-five years since by Admiral Aube, father of *la jeune ecoly,* who laid down its principles *(la vitesse, le nombre, l'invisibilité, l'invulnerabilité, la specialisation),* and its special tactics and outlined the characteristics of its *instruments de combat.* Experiments were made in 1889 with *bateaux-canon* and *bateau torpille,* and later, in 1903, with motor boats. (Algiers-Toulon race), but the prejudice of retrograde senior officers, and especially the ridiculous Ministerial instability, have rendered that pioneer work useless to France, though not to rival observers. The persevering continuity of British naval policy and the slow but uninterrupted and comprehensive advance of the London Constructional Department contrast with the spasmodic efforts of the Paris Section Technique, the *ingenieurs* of which besides are too much saddled with routine *paperasserie* work, and too ephemeral in their offices, to be able to utilize to good advantage whatever inventive genius they might possess. Rational utilization of the factor time and continuity of effort are impossible under the actual French régimé of instability, and that is the worst thing that can be said against it.

The recent accident to the *Beligny,* torpedo-boat (ex-German), that tore her bottom in the Teignouse Channel, close to the sunken wreck of the battleship *France,* caused a painful impression in naval circles. Incompetence on the part of commanding officers is not considered to be the cause to blame. The *passe de la Teignouse,* that leads to Quiberon Bay from the high sea, is not only narrow and winding but also swept by strong currents, which render passage by night a delicate affair. Both the *France* and the *Deligny* (minor injuries) came to grief in the course of night maneuvering after carrying out night firing practice under conditions especially trying for the crews. To that cause Admiral Degouy ascribes the mishaps. There is a limit to human endurance and, with weekly night maneuvering all the year round, accidents are bound to happen, especially as the High Command prescribes to boat commanders the use of the most difficult passages with a view to giving better value to the training. Another passage, wide and safe, is the Chenal des Cardinaux (which the British fleet utilized in 1759, when pursuing the improvised admiral, Marquis de Conflans), but it is despised as being too easy and uneventful; it is not sport. The ignorant

public is for safety at any price, and with anger computes the cost of every accident, but true naval men are for the old policy of running risks, and they are prepared to accept with equanimity any number of accidents rather than foster-mother in the service commanders afraid of risks and responsibilities. All the same accidents are no commendation for promotions. Captain Guy, of the battleship *France,* was solemnly kissed by Minister Raiberti as a consolation for losing against his will a fine *cuirassé.* No kissing up to the present, at least officially, celebrated the bumping in of the bottom plates of the *Deligny,* and, indeed, it is not worth it. The robust construction of that German-built destroyer was shown by the accident, that would have been fatal to a flimsily-built boat and only determined a leak in the case of the *Beligny.*

New French Submarines

Naval and Military Record, 30 July, 1924.—It is a curious fact that the French, who have so often been the pioneers in naval progress, so often lag behind in following up their own ideas. France invented the ironclad, yet in her latest type of armored ship she cannot claim anything like equality with the other great naval powers. It may not be historically correct to say that France invented the submarine; it is assuredly true that we owe the modern submarine almost wholly to French initiative and yet what do we find France making of her own conceptions? A few days ago her " last word" in first-class submarines was launched at Cherbourg and named the *Requin.* She is described as a sea-going submarine, designed to solve the problem of speed and mobility, to act in liaison with surface vessels.

The *Requin* is 1,100 tons on the surface and 1,400 tons submerged displacement. This is big enough for the realization of the rôle she is intended to fill, but her surface speed is 16 knots, and her submerged speed 9 knots. How is a submersible of such very limited mobility going to maneuver with a surface squadron? Eight years ago the Germans were building faster craft. Our own *K* boats of five years ago are capable of 21 knots. The *Requin* is the most powerful submarine which the French navy yards have thus far turned out. It is not for us to question the tactical ideas of her designers. Evidently a very extended sea-keeping endurance has been arrived at, for we are told (rather indefinitely, it is true) that the new boat is capable of a forty-day cruise.

Controversy Around Large or Small Submarines

By J. B. Gautreau, *Naval and Military Record,* 9 June, 1924.—With the new British submarines and the next French submersibles of 3,000 tons (the plans of which are now being prepared) we are entering an era of submarine cruisers and of submarine warfare on the high sea, so much so that it is safe to say the command of the sea and safe communications in the next war will for a great part depend on underwater craft. At the same time, many naval men on this side of the Channel are not yet reconciled to the idea of investing so much in essentially vulnerable submarine eggs. *Croiseurs-sousmarins* of 3,000 tons and more, they point out, will have their radius of action limited to the high sea, and with their 120-meter length will be forbidden for operations in shallow seas and along coasts; their vulnerability will increase in proportion to their dimensions and—decisive arguments in the opinion of many—they will not be able to deal harder blows than craft of smaller dimensions would do; and for most operations of war there is no admiral who would not prefer to have three submersibles of 1,000 tons rather than one single unit of 3,000 tons. Torpedoes being of the same caliber on all those units, the chances of hits are, of course, multiplied by the number of submarines. Lastly, the air menace is con-

sidered to be deadly to large underwater vessels, that will be easily detected by seaplanes and set upon with depth-charges or with smaller submarines. Moreover, efficient submarine warfare requires numbers—especially when disabilities peculiar to underwater craft are considered, they permit only one-third of the total effective in commission being used at a time—and the fact to be borne in mind is that big submarines mean few submarines. Constructor Laubeuf, with war statistics and lessons in hand, demonstrated that there is no need to exceed 1,000 tons for ocean-going submarines (Fulton type), that tonnage providing sufficient radius of action for all practical purposes.

On the other hand, progressive officers are in favor of following the English lead in the matter, for the reason that France is, like Great Britain, a world empire, with colonies to defend in every sea, and needs strategic weapons possessing range and speed, capable of catching their prey in the mid-ocean, and of preventing attacks by waylaying the incoming enemy where and when he least expects attack. For submarines, as for other classes of warships, increased displacement means increased power for both offense and defense. For instance, Constructor Simonot showed that, whereas two submarines of 1,100 tons mount together twenty torpedo-tubes, and have speeds of 16 knots on the surface and 10 knots under, a single 2,400-ton vessel that would cost the same price (30,000,000 francs), would mount twenty-four torpedo-tubes, bigger guns, and steam at 20 knots on the surface, while having the advantage of a more robust all-round construction and far better conditions of habitability. Only for defensive work in European seas can the smaller units be considered a better investment, but for the purpose of *la grande guerre,* in cooperation with fast cruisers, a 3,000-ton *croiseur-sousmarins* can render invaluable services, being able under certain circumstances to play a rôle similar to that played at the Falklands by the battle cruisers of Admiral Sturdee. Armor plating ought to cover, it is urged, the upper decks of *croiseurs-sousmarins,* with a view to enabling them to meet 10,000-ton cruisers on something like equal terms, the armament to consist of 8-inch guns in raised turrets.

Night training on the Brittany Coast has its utility, owing to the thousands of submerged rocks and needles and to the vagaries of currents and tides. The 1,100-ton destroyer, *Deligny,* has just had a long slice of her bottom torn away on rocks close to Teignouse pass, where lies the wreck of the 24,000-ton *France.* Bad luck and wrong steering explain the accident.

A detailed study of the recent exercises in the Bay of Biscay confirms the smart work of the destroyers that detected the *Jean d'Arc* near the Spanish Coast, shadowed her all night, attacked her twice under cover of showers of rain, and maintained under difficulties effective wireless communications with the flagship.

As a complement to these maneuvers, Brest submarines, under the flotilla commander (whose pennant flies in the Aviso "Arras"), carried out an *exercice de recherche,* signalling and concentration on the route Cap-Ortegal-Brest. Submarines, not detroyers, are the best scouts to send across the route of a superior enemy.

English v. French and German Destroyer Designs

Naval and Military Record.—The question of destroyer design and the relative value of French, English and German compromises have been the subject of exciting controversy in naval circles. Comparing together the British *M* class, French *Lestin* and ex-German *Delage* of approximate displacement, the French is seen to carry the lighter armament (two 4-inch guns and five small quick-firers), and at the same time to be slower on paper at least. The Germans, despite inferior freeboard, habitability and

nautical qualities, are superior fighting machines, mounting heavier guns and torpedoes, and recent tests showed they can hold their own in a seaway with the best *contretorpilleurs* of French make. Being extremely wet at sea, they are disliked by the crews, but the fact remains that they were designed by military brains, bent upon drawing the highest military utilization out of every inch of space. After all, warships are not yachts: offensive power is the object. To this argument *officers de vaisseau* reply that there is a limit to human endurance, and the German boats, excellent for short spurts and coastal defense, do not compare with English and French destroyers for service on the high sea.

The 1,450-ton submersible *Requin*, just floated at Cherbourg, inaugurates a new type in underwater architecture, having yachtlike bows and being obviously made for comfortable and fast surface running.

GERMANY

Germany's Attitude Toward Disarmament

By Robert E. Dell, Baltimore *Sun*, 22 July, 1924.—Frankfurt-on-Main, June 30.—No sooner was the ministerial crisis over than another was caused by the question of military control. The German Nationalists, having failed to get into the government on their own terms, tried to intimidate the government into rejecting the demand of the Allies for an inquiry into the state of German armaments, and very nearly succeeded.

The reason why they came so near to success was that they were supported by certain members of the government itself and, above all, that General von Seeckt, the commander-in-chief of the Reichswehr, refused to hear of an inquiry into armaments and threatened open insubordination of the government agreed to it.

The joint letter of the British and French Prime Ministers to the German Government saved the situation. It was a brilliant stroke and its effect was instantaneous. The opposition collapsed like a house of cards. The letter was as admirable in manner as in matter. Even Nationalist papers were obliged to recognize its friendly tone, and its effect on public opinion was excellent.

Mr. MacDonald and M. Herriot are to be congratulated on having had the courage to depart for once from diplomatic usage and make a direct appeal to the German Government. They have known how to act in a dangerous emergency. Had the letter not been sent, it is almost certain that the German Government would have given a negative reply to the demand of the Allies, and that would have meant the wreckage of the settlement, the prospects of which are now so good.

With this difficulty out of the way the situation in Germany is brighter than it has ever been since the Treaty of Versailles was signed. The inquiry into armaments will probably show that the disarmament provisions of the treaty have not been strictly observed, but also that some of the reports about German armaments have been much exaggerated.

That there are hidden stores of arms all over the country cannot be doubted, but they are at present a danger to the German Republic rather than to the Allies. They consist of rifles, revolvers and a certain number of machine guns, with ammunition, but there are not in Germany the necessary armaments for a modern war. Nevertheless, the hidden arms are indirectly dangerous to the Allies, since civil war in Germany would make the successful working of the Dawes or any other plan for reparations impossible.

The military commission will find the German workmen ready to help in the discovery of hidden arms, for nothing would please the workmen more than the seizure of all the hidden arms in Germany.

There are also certain other matters that require investigation, such as the regimental associations, the object of which is to keep the old regiments together and which have, to a great extent, bellicose aims. The training of the Reichswehr and its connection with illegal armed organizations is another matter to be inquired into.

After the inquiry it will be wise to transfer military control to the League of Nations, which will have the advantage of being impartial and neutral. It is a pity that the inquiry was not intrusted to the League of Nations, as the *Temps* proposed three months ago. M. Poincaré, however, refused to agree to that. A control exercised by the League of Nations would have the confidence of the mass of the German People, who are not at all hostile to disarmament.

Nobody could have hoped that only two months after the general election, in which the German Nationalists had so much success, they would be so completely thwarted in all their aims as they are today. They have partly themselves to thank, for they could hardly have played their cards worse. The most important factor, however, in their discomfiture has been the combination of firmness and conciliation shown by the British and French Governments.

The release of the prisoners and return of the exiles in the Rhineland and the Ruhr has had an immense influence on German opinions. In spite of the efforts of the Nationalist extremists to persuade the German public that M. Herriot is a humbug and that French policy is unchanged, the German public in its vast majority believes in M. Herriot's sincere desire for reconciliation between France and Germany.

The Nationalists, who do not want reconciliation, but an eventual war of revenge, prefer M. Poincaré to M. Herriot. Their policy of the last few weeks, which has been a policy of pure wrecking, has no meaning unless its purpose was to make M. Herriot's position impossible and thus prevent reconciliation. Indeed, the extremists among them say that openly.

Another factor in the situation, which is less obvious, is the discredit of Fascism in Italy. It must not be forgotten that the birthplace of Fascism was Bavaria. Its inventor was Escherich, the Bavarian monarchist, who spent some time in Italy and gave Mussolini his ideas, and there has always been a close connection between the Bavarian and Italian Fascists, as between the former and the so-called "Awakening Magyars" in Hungary, who are Fascists under another name.

The German Nationalists do not conceal their dismay at the revulsion of feeling in Italy and the exposure of corruption and criminality of the Fascist régime. The *Deutsche Zeitung* declared last week that there was a conspiracy of "cosmopolitan finance" against Italy and Germany!

The effect produced on public opinion in Germany, as in other countries, by the murder of Matteotti, which, after all, is only the latest of a long series of similar crimes, is no doubt due to the fact that for the first time, owing to the relaxation of the Italian censorship, the world has learned the truth about Fascism. Until now any correspondent that dared to tell the truth would have been promptly expelled and would have been fortunate to escape personal violence.

A girl who represented an American paper in Rome was threatened by the Fascists with the castor-oil torture on account of an article that she had sent to her paper and escaped only by a promise to abstain in the future from writing anything disagreeable to the Fascists.

Above all, the revelation that leading Fascists and intimate friends of Mussolini himself are implicated in the murder of Matteotti has made a great impression, and so has the fact that the object of the murder was to prevent Matteotti from exposing a vulgar affair of "graft" in which these gentlemen were compromised. The people here that were crying out for a

dictator are now recognizing that dictatorship does not work and that a dictator is usually a man who cannot do as he likes. For it is improbable that Mussolini, who has hitherto refused to allow any inquiry into the affairs of corruption and any proceedings against the Fascists perpetrators of murder and outrage, would have so acted had he had his own way.

There is a story in France that he said to somebody last year that it was true that he had got into power with the help of the canaille. Whether the story be historical or not, it no doubt represents Mussolini's position. He would like to be rid of the canaille, but the cannaille will not be got rid of and he has been forced, against his will perhaps, to tolerate the crimes of the men to whom he owes his position.

Germany's Secret Army

Washington *Star*, 30 July, 1924.—One of the basic principles of the Versailles Treaty, upon the terms of which Germany was allowed to retain her sovereignty, was that that country should not be permitted to maintain a large army, or the making of a great fighting force. The numbers of the men enrolled for military duty were strictly limited. The store of munitions was set at a low point. The naval and air equipment was reduced to the minimum. It was the design of the treaty makers to keep Germany to the point of incapacity.

Ever since the treaty was signed, however, the Germans have been seeking to evade its terms in this, as in other respects. Large forces of armed men have been brought into being, in one guise and another, as "police" and as "reserve police." Upon the pretext that they were needed to prevent the overturning of the government they maintained veritable armies. A military control commission representing the allied powers was given power under the treaty to inspect the German military forces from time to time and observe the matter of munitions. Despite the watchfulness of this commission the process of increasing the military machine has continued.

It is now reported from Berlin that the commission has broken off relations with the German War Department. General von Seeckt, minister of war, demanded that the commission give forty-eight hours' notice before inspecting any German military organization or plant, plainly to prevent the observation of items that might be camouflaged or hidden. He also demanded that the commission post a notice at every place inspected to the effect that it would be the last inspection of the German military forces the entente would undertake.

Naturally these demands were rejected. The French Government, in particular, refused to accede to what would be tantamount to abandoning all rights of supervision over the Geman military machine under the treaty. It has likewise charged that serious breaches of faith have been committed. The Berlin war office has adopted the system, it is asserted, of granting leave of absence to thousands of commissioned and non-commissioned officers for from three to nine months, these officers not being counted as part of the force of 100,000 men the treaty permits. To replace then an equal number of men were taken in the army. Thus there is, it is declared, a system of substitution whereby officers are being trained for an army of not less than half a million men, or five times the treaty allowance.

These infractions of the treaty are brought to light, or rather brought to the point of issue, precisely at the time when Germany's financial fate is in the balance in the London Conference. Whether the coincidence is a matter of French maneuvering or of German blundering is to be left to speculation.

JAPAN

Japanese Sea Power

By Sir Herbert Russell, *Naval and Military Record*, 9 July, 1924.—A year ago, within a week or two, when news reached this country of the terrible earthquake which had devastated Japan, people were saying that the catastrophe would leave her reduced to the conditions of a second-class power for years to come. Others, with some acquaintance with international naval affairs, even went so far as to regard it as a blessing in disguise. They pointed out that the United States was ripe for a further step in the limitation of armaments, and that we were fully disposed to be acquiescent in the same direction. With the bogey of rivalry for domination of the Pacific laid low, the way was now clear for an extensive process of beating big guns into little ploughs.

For my own part I claim no sagacity for complete incredulity in this comfortable conclusion. It did not require much hard thinking to realize that the Japanese Navy had really suffered very little from the earthquake. The zone of destruction, centered, as usual, in the Hakone District, was remote from the big naval establishments and, having been in Japan little more than a year previously, I certainly was not prepared to believe that the catastrophe was going to lower her status among the great powers. The Japanese are a nation of wonderful recuperative powers. The qualities which have made them what they are today carry them to the crest of any crisis. They are no more to be submerged by the devastation of a few towns than the French were to be beaten by the destruction of Rheims.

And what do we find today? The effect of the earthquake upon Japanese sea power has long since been precisely calculated. The damage to the fleet was so trifling as to be virtually negligible. The injury done to vessels in course of construction was surprisingly small, probably because a building slip is a very solid structure, and the framework of a ship will stand a great deal of shaking without being any the worse for it. A considerable amount of machinery was wrecked. The chief loss was in stores and oil fuel, in which latter Japan has never been well off, but there is nothing irreplaceable in the damage done by the great earthquake to all that pertains to Japan's sea power. Moreover, most of the damage has now been made good, and she is proceeding with her very big program of naval construction with that stoic perseverance which is alike the admiration and the concern of the western world.

Probably we do not sufficiently realize the effort of this upon well-informed opinion in the United States. America is very much concerned about her own naval position at the present time. The avowed reason for this dissatisfaction is the admittedly superior efficiency of the British Navy. There has been so much insistence upon this that it is scarcely surprising a feeling of resentment has been touched on this side of the Atlantic, but is it not possible that this comparison is all political eyewash? There is no rivalry between the British and American Navies. Why, then, imply that there is, and that this is an adequate reason for a great burst of activity in American naval shipyards? Maybe there is a feeling that no harm will be done by pretending that it is Codlin when it is really Short.

The Japanese Navy Estimates for the year 1924 devote a total of nearly 24,000,000 pounds to "naval undertakings." This total is about two and a-half times the amount estimated to represent the losses suffered through the earthquake. These "naval undertakings" are going on very busily: there is no slackening of the pace for want of money. At the present moment there are eighty-four warcraft, either on the stocks or in various stages of progress afloat, intended to reinforce the Japanese Navy. The total tonnage of this embyro armada is 178,065. It is very significant of the

resolution and the desire for secrecy underlying Japanese naval policy that all these vessels are being built in the country. British and German yards can turn out completed warships at less than half the cost of Japanese yards. The Japanese naval authorities themselves admit this. British and German yards would have looked upon a share of this work as a godsend but, despite the strong attraction of economy, the Japanese prefer to build the whole of their new ships themselves. Is it wholly unreasonable to conclude from this that they don't want to attract the attention of the rest of the world more than can possibly be helped?

The figures I have given refer to construction actually in hand, but this does not finish the Japanese program. In addition, there have been authorized four cruisers and an unspecified number of submarines and destroyers. No details of the cruisers have been permitted to leak out, but it is safe to assume that they will not be inferior in size, speed and armament to corresponding vessels either building or to be built by the other great naval powers.

The alien exclusion measure has come at a very inopportune time for the United States. It has given great offense throughout Japan, and not without reason. The United States may claim the right to keep the Japanese, or any other race, outside the frontiers of their much-favored land, but they are not going to court any particularly friendly sentiments by so doing. Six months ago, I believe, Japan would have discussed further limitation of sea armaments with perfect goodwill and in perfect good faith. Today she will discuss nothing but speeding-up her naval program. She is never demonstrative in her resentment.

The strength of Japan's fleet-in-being is given in the text-book and I need not summarize this. By the Washington Agreement the ratio of her naval strength to that of this country and the United States was settled in the proportion of 3-5. The formula is a misleading one. It is confined to certain material details only, and omits to limit the numbers of such important units as cruisers up to 10,000 tons, destroyers and submarines. Moreover, it fails to take into account—for the simple reason that it would be impossible to take into account—the vital quality of personal efficiency. Any standard for measuring relative naval strength which eliminates the human element, save in mere numerical restriction, is bound to be very speculative.

What is at the back of the strenuous effort which Japan is now making to expand her sea power on a very formidable scale in every such direction as her adherence to the Washington Agreement permits? I do not think the true answer needs much seeking. The Japanese are not naturally a belligerent people. Neither is their "Bushido" sentiment so deep and sincere as people in this country appear to believe. A distinguished Japanese admiral with whom I dined at the Naval Club in Tokyo, expressed his conviction that there was more real patriotism in the British Navy than in his own service. He may have intended to be excessively complimentary, but somehow I don't think so. My own conviction is that Japan has no idea of entering upon a war of conquest. Of course she would like Australia, but she knows perfectly well that, although it would be comparatively easy for her to swoop down and establish herself, she would soon have to come out again to defend her own country against prompt retaliation. She would like India. Japanese dealers openly go about in the native bazaars telling the credulous Hindus what a glorious time they will have when the flag of the Rising Sun replaces the Union Jack, but no responsible Japanese looks upon this as anything more than a pleasing phantasy.

However, Japan must have something. This is the simple, inexorable truth. Her territory is about the same in area as the British Isles. At the present time it is carrying a population of some 10,000,000 more. We know how overcrowded our own land is. It needs no particular effort of fancy

to picture the plight of Japan. She must have room for expansion. From choice she would prefer that expansion to be of the peaceful order. Korea has long been the object of her languishing gaze. China knows it only too well and the Chinese hate the Japanese with a bitterness which is incredible to one who has not seen practical evidence of it. When a Japanese cruiser squadron came to Hong Kong to escort the *Renown* to Yokohama the crews were not permitted to land: it was deemed inadvisable to risk a fracas with the inhabitants of China Town. The officers went ashore in mufti and returned to their ships before dark.

Look where she may, Japan can see no solution to her problem in the doctrine of peaceful penetration. The American Immigration Act has come as a painful reminder that her people are not wanted, but sooner or later—and probably a great deal sooner than we realize—she must have an outlet, and she will be prepared to fight for that outlet with all the strength she can summon up, if need be. Doubtless she trusts that her readiness for war will avert war, but let there be no mistake about it. Japanese naval policy is dedicated to a very real and a very legitimate objective. The western powers lose no occasion for proclaiming that they will never countenance the partition of China, but will they be able to stop it should Japan, in her own time, make an entry into Korea? While Britain and the United States are preaching further disarmament, Japan is pushing ahead with a naval program bigger than that of both these powers combined. She is not doing it in a spectacular way, as the German Empire did before the war, and she is giving no hint as to why she is doing it at all, but there is the fact, and here, I venture to suggest, is the explanation. The United States Navy Department sees it clearly enough. There will be no further limitation of armaments, however loud the pacifists may shout and the League of Nations enjoin.

Japan's Naval Program

Washington *Post*, 21 July, 1924.—From an official memorandum analyzing the Japanese Navy Estimates for the fiscal year 1924, it appears that the total sum to be expended on naval undertakings is 238,000,000 yen, roughly two and a half times as much as is represented in losses suffered through the earthquake. It is explained that the number of auxiliary combatant craft newly constructed or to be constructed has not been altered since it was published under a revised program in July of last year. The date of completion of the vessels now in course of construction or to be ordered, however will be postponed to some extent, owing to retrenchments in naval estimates.

In the following table there are shown the cruisers, destroyers and submarines already completed or ordered, and those to be ordered, as in July last year, and those which have since been ordered:

CRUISERS

The *Tenryu, Tatsuta* and others already completed or ordered as in July of last year	17
Already ordered	6
To be ordered	2

The work of construction has been started only on two vessels, the *Kako* and the *Furutaka*, the laying down of the keels of other four vessels being postponed till all necessary materials are available.

DESTROYERS

The *Yekaze, Tanikaze, Nara, Kuwa* and others already completed or ordered as in July of last year	57
Already ordered	9
To be ordered	15

Only five vessels are being built, the laying down of the keels of other four vessels being postponed until all necessary materials are available.

SUBMARINES

Those already completed or ordered as in July last year	47
Already ordered	5
To be ordered	17

This table shows a modification on the original program of auxiliary combatant ships to have been completed by 1927. That program allowed for twenty-six cruisers, ninety-four destroyers and ninety-three submarines. The new program allows for a reduction of one cruiser, thirteen destroyers and twenty-four submarines. The foreign office invites consideration of this point when it is urged by foreign critics that Japan is diverting the energy she formerly applied to the construction of capital ships to an expansion of her auxiliary fleet.

UNITED STATES

Long-term Enlistment as a Naval Requisite

By Hector C. Bywater, Baltimore *Sun*, 24 July.—London, July 3.—Very few of the critics who have taken part in recent discussions on the status of the American Navy have bestowed attention on what is, after all, the crucial factor in every sound estimate of comparative strength.

Mostly they have confined themselves to pointing out deficiencies in material. The Navy, they say, has many battleships which could not fight a prospective enemy on equal terms. It has ships inferior in speed, armor protection and gun range. It has less than one third of its proper quota of cruisers. It has no flotilla leaders for the destroyer force and its submarines, though numerous, are handicapped by unreliable engines.

All of this criticism may be justified—much of it certainly is—but it leaves entirely out of reckoning the one supreme element which makes or mars the war-readiness of the American or any other navy. Men fight, not ships—an aphorism almost as true in these days of highly complex fighting ships, "boxes of steel crammed with machinery," as in the sailing ship era.

Before the advent of steel and steam naval combats were won by superior seamanship and by speed and precision in working the primitive ordnance with which ships were then armed. Often in those days, a small ship manned by a thoroughly competent crew was able to defeat an antagonist who carried twice the weight of metal, but whose officers and men were wanting in skill and resolution. The pages of naval history teem with such incidents.

Since then, however, developments in material have so far altered conditions that victory nowadays is much more likely to fall to the biggest ship and the heaviest gun, but the material in all modern navies is more or less standardized. There is very little difference between the latest battleships of the United States, Britain and Japan. On paper they are equally matched and it is precisely because of this equality in material that the human equation assumes such vital importance.

For once, therefore, let us drop the tons and guns method of computation and endeavor to determine the relative position of the American Navy on the basis of man-power.

In this matter numerical strength is not the prime consideration, though it is, of course, a very important one. The latest figures are not available, but this is how the three leading navies stood at the beginning of last year:

Officers, seamen and marines	Britain	U. S.	Japan
	118,403	113,719	75,453

The above totals, which are taken from the German annual *Nauticus*, need revision. They include a considerable percentage of personnel which would not be available for sea-going duty, especially in the case of the

United States, but they serve roughly to indicate the comparative manpower of the three navies in the post-conference period.

The next question that arises is whether the officers and men of these navies are all equally well-trained and proficient in the execution of their duties. It is impossible to answer this question with assurance. War is the only positive test, and that, we all hope, will never be applied, but a study of the length and conditions of service in each navy should be helpful in enabling us to form conclusions.

In a survey of the personnel problem some two years ago an American service paper wrote as follows:

"The British enlisted strength is composed of men serving in twelve-year enlistments, whereas our own enlistment periods are for two, three and four years, resulting in a heavy turnover, which amounted last year to sixty-eight per cent. Of our force, 82,849 were youngsters in their first enlistment, and 16,552 more men had had less than four years' previous service. The British Navy last year included 68,361 men serving in the first period of continuous service: viz., for twelve years; 21,000 men were in their second period of continuous service (ten years to complete time for pension), and 8,501 were in so-called 'short service' (five years plus seven in the service). As for the Japanese Navy, it is known that the proportion of trained, efficient men is much greater because of the nature of her population."

The same journal quoted an American captain, recently commanding a battleship, to the effect that the enlisted men in his ship averaged less than nineteen years of age and consisted in large part of those serving their first enlistment. The past two or three years, it was added, had been a period of constant turnover of enlisted personnel—a recruiting drive followed by a wholesale discharge of men, closely followed in turn by another drive, only to result in a big reduction due to diminished appropriations.

Matters have since been improved by suspending the two and three year enlistments and establishing a four-year term as the minimum. Even so, the period of service is too short and still compares unfavorably with the systems prevailing in the British and Japanese Navies.

The great majority of British naval seamen are enlisted for twelve years, and a considerable percentage reënlist for a second term. Japanese volunter recruits serve six years, conscript recruits three years, but the volunteers now outnumber the recruits by four to one.

Assuming a common standard of intelligence, physique and morals for the recruits of all three navies, the immense advantage enjoyed by the British Navy by reason of its long-service system becomes self-evident. If two men of equal caliber enlist and pass through a similar course of training, the one who serves twelve years must obviously be more familiar with his work and a handier man in every way than the one who serves only a third of the time.

I have seen it stated by some American writers that the alert mentality of the average American youth enables him to absorb instruction, especially of a technical nature, more readily than the slower-witted foreigner can do. This may be so, but few will be bold enough to maintain that the brightest type of American youth could reach in four years the degree of proficiency in the naval art which the British enlisted man takes twelve years to attain.

It must not be supposed that recruits for the British Navy are enrolled haphazard, without regard to their physical and mental fitness. On the contrary, the standard of admission in both respects is very high and the training schedule is as practical and thorough as long experience can make it. In the Japanese Navy also recruits are selected with the greatest care and trained on the most up-to-date principles.

As Lieutenant E. R. Henning, of the United States Navy, wrote a year or two since when advocating a six-year term of enlistment: "Every officer

knows the adoption of the long enlistment period would result in the nation getting a return for the early years when the recruit is receiving and not giving. Other powers have six and eight year service periods. Isn't it somewhat fatuous to believe that we can do as much with our recruits in four years?"

Greater efficiency in the performance of work is by no means the sole advantage accruing from prolonged service. A recruit of average intelligence could, no doubt, master in four years nearly all the tricks of the naval trade which an enlisted man is required to know. Within that period he can be molded into a useful member of the gunnery or engineering force.

But something more than mechanical aptitude is wanted from the enlisted personnel. That disciplined teamwork which contributes more than anything else to the winning of battles can only be achieved after long years of service—the sort of discipline, that is, which does not break down in the fiery ordeal of war, and the perfect teamwork that results when a group of men all do the right thing at the right moment because they have done it so often in company.

Danger is the acid test of discipline, and discipline itself, though not a substitute for courage, is a complementary quality without which mere courage counts for little in modern naval warfare. A crew of brave but ill-disciplined men would be more liable to succumb to demoralizing influences than a crew composed of men whose personal courage, though less pronounced, was fortified by the bonds of discipline.

The following extract is taken from a report by the captain of H. M. S. *Lion*, written three days after the battle of Jutland. It speaks for itself:

"The conduct of the officers and ship's company (during the battle) was in every detail magnificent. The ship has been in commission for so long, and the men are so highly trained, and have such a fine spirit that even in action they can do almost anything without their officers. The unnerving sights that occurred, with the heavy casualties, which amounted to ninety-five killed and forty-nine wounded, mostly in the first two hours of the action, were a tremendous strain on the strongest discipline, yet there was never the least sign of wavering in the least degree from their duty."

Such are the fruits of discipline, in the true meaning of the word.

The adoption of a six-year term enlistment would probably do more to enhance the fighting power of the United States Navy than the addition of a new battle squadron. It would insure continuity of training, keep the same crew together in one ship for a long period, and create that sense of responsibility which often is absent when a man knows his assignment to a particular job to be only temporary. It would tend to make every combatant unit of the fleet a real fighting ship by reducing the number of "green" or half-trained men who, under the short-service system, necessarily represent a big percentage of the crew. Officers could devote less time to "breaking in" and more to their proper executive duties. The result would be a steady, progressive increase in the military efficiency of the whole Navy.

The Naval Situation

Scientific American, 24 August, 1924.—During the past few months, the public has been presented through the daily press with a vast amount of discussion of the supposed weakness of the United States Navy and its failure to measure up to the 5-5-3 standard. The greater part of this literature, so far as the standard is concerned, was entirely wide of the mark; this for the reason that it covered naval material that does not come within the scope of the Washington Treaty, which dealt exclusively with capital ship and airplane carrier strength. The treaty, as finally drawn, had nothing to say about the relative strength of the navies in unarmored ships—cruisers,

destroyers, submarines, gunboats and supply ships. Hence, all these attacks on the Washington Treaty, so far as they deal with unarmored ships, miss the point entirely and have nothing whatever to do with the question. Therefore, let it be again asserted that under the treaty the United States holds today its full value of 5 in the 5-5-3 ratio.

The standing of the United States relatively to Great Britain and Japan, in unarmored ships, is not satisfactory. So far as numbers are concerned we hold first place in destroyers and submarines, and in quality our destroyers are, on the average, superior, being relatively quite modern, of high speed, and carrying an unexcelled torpedo armament. The submarine situation it must be admitted is far from satisfactory, though not nearly so bad as some irresponsible alarmists have stated. We are weak in sea-going submarines capable of accompanying the fleet; for these Congress should make the needed appropriations. In the matter of light or scout cruisers we are relatively weak; but we have made a very fine start with our ten 9,000-ton, 34-knot cruisers of the *Richmond* type. However, since other nations are building a certain number of cruisers up to the conference limit of 10,000 tons, and armed generally with guns up to the conference limit of eight inches caliber, Congress should appropriate for at least eight ships of this type.

In view of the many sensational articles that have been written about the renewed shipbuilding competition in unarmored ships, we here and now emphatically assert our conviction that since the war there never has been and there is not now any such competition. The cruisers which the various nations are building are only such as the depreciation of the older ships at the bottom of the list necessitates. There is naval peace in the Atlantic and in the Pacific, and if our irresponsible congressmen will only refrain from such unwarranted insults as that recently offered to Japan, this peace will be unbroken we believe for many a decade to come. If Congress had left this matter in the hands of the President and the Secretary of State, the desired result would have been achieved without offence to the racial feelings of a friendly people.

Relative Naval Strength

Naval and Military Record, 9 July, 1924.—As to the sincerity of the desire expressed on behalf of the people of America to place an effective check upon the race for armaments when the Washington Treaty was under consideration there can be no question. The almost prodigal manner in which the United States entered into the agreement to sacrifice new ships afforded abundant proof of this, but during the last month or two the demand for increasing the efficiency of the American Fleet has been so loud and insistent that people in this country, as well as on the other side of the Atlantic, have been wondering what is the motive of those who have been clamoring so frantically for a big Navy.

It has even been suggested that instead of the ratio of the naval strength of Great Britain, United States and Japan being 5-5-3, as agreed upon, the American Navy has been allowed to deteriorate so sadly that the ratio is now Great Britain 5, Japan 3, and United States 1. Of course this is all nonsense; but perhaps it has served the purpose of those who, it is suggested, are endeavoring to show that at the Washington Conference America got what is described as a "raw deal." It is not suggested that in taking steps to maintain the efficiency of the British Navy this country has exceeded her rights under the pact so solemnly entered into at Washington, but sufficient credit does not appear to be given to Great Britain for its "gesture" of good faith in having taken the lead in the direction of navy reduction.

It is therefore gratifying to find in a responsible and discriminating paper like the *Scientific American* a clearly-reasoned survey of the position.

Articles in the press, that paper states, emphasize the fact that America is scrapping thirteen modern battleships, but nothing is said about the fact that "before America commenced to scrap any modern ships—that is before France had signed the treaty—Great Britain had scrapped eighteen modern battleships and 750 other ships of her great navy, and that, with the exception of the treaty battleships, she had done all this reduction voluntarily." It might be added that the scrapping of our Navy proceeded so rapidly that at one time fears were expressed that there was danger of overstepping the bounds of prudence.

Appropriations for Navy

Army and Navy Journal, 19 July, 1924.—The Secretary of the Navy has approved the apportionment of the appropriations for the Navy as recommended by the Budget Office. The total funds distributed this fiscal year for the Navy are $289,664,100.09. This includes the balance under the provisions of the appropriations for 1924 of $13,000,000 and permanent allowances of $2,103,260.00, and transfers from other departments.

Among the larger items in the distribution to the Regular Navy is $2,530,000 for pay, miscellaneous; $3,600,000 for transportation; $498,825.35, recreation of enlisted men. Engineering comes in for an extraordinary amount this year, the total being $17,420,000. Construction and repairs follows closely behind with $15,435,000; ordnance and ordnance stores, $9,649,000. The allotment for the pay of the Navy, 1925, is $117,000,000; for maintenance, S. and A., $9,660,000 while fuel and transportation for 1925 was allowed $15,492,000. The Medical Department has an allowance of $2,271,856.46.

Under Public Works the following allotments have been made:

Navy Yard, Portsmouth, N. H., $40,000.00; Navy Yard, Boston, Mass., $220,000.00; Navy Yard, New York, N. Y., $71,000.00; Navy Yard, Philadelphia, Pa., $50,000.00; Navy Yard, Washington, D. C., $50,000.00; Navy Yard, Norfolk, Va., $50,000.00; Navy Yard, Charleston, S. C., $30,000.00; Navy Yard, Mare Island, Cal., $785,500.00; Navy Yard, Puget Sound, Wash., $350,000.00; Naval Station, Guantánamo, $14,000.00; Naval Station, St. Thomas, V. I., $3,500.00; Naval Station, Pearl Harbor, $198,000.00; Naval Station, Tutuila, $87,000.00; Naval Station, Guam, $33,000.00; Naval Station, Cavite, $141,000.00; Naval Torpedo Station, Keyport, $85,000.00; Naval Training Station, San Diego, Cal., $40,000.00; Naval Training Station, Great Lakes, $115,000.00; Naval Fuel Depot, San Diego, Cal., $60,000.00; Submarine Base, Pearl Harbor, $50,000.00; Naval Station, San Diego, Cal., $155,000.00; Supply Depot, M. C., San Francisco, Cal., $500,000.00; Aviation, Navy, 1925, $15,500,000.00, less reduction for Retirement Fund $50,000.00, net $15,100,000.00.

Bright Outlook for the Navy

Army and Navy Journal, 2 August, 1924.—Chairman Butler of the House Committee on Naval Affairs is reported as taking a more hopeful view of the prospects for Navy legislation at the next session than he did at the beginning of the last. Last session, when he took up the work of the committee, he expressed doubts as to whether there would be much legislation passed for the Navy at that session. Now, in his opinion, the cruiser bill will be passed by the Senate immediately upon the convening of Congress. He also believes that the bill for the equalization of promotion between the line and staff, and the naval omnibus bill will be passed at the next session.

Chairman Butler does not anticipate that any extended hearings will be necessary before the committee will be ready to take action on the equalization bill or the omnibus bill. Both of these bills have been thoroughly discussed by the committee and, according to the program, the equalization bill will

come out of the House Committee in the first week's session. One of the first committees to have a day in the House will be the Naval Affairs Committee, as it was due on the calendar when Congress adjourned for the first session. It is not believed that the Mare Island controversy will come up at the next session. Hearings and consideration of the subject consumed most of the time of the committee last session without any results.

The opposition to the cruiser bill, which provided also for the modernization of the *Florida, Utah, Arkansas* and *Wyoming* will be placed in a very embarrassing situation by the fact that the department has been forced to place the *Florida* in reserve status at the Boston Navy Yard, with about twenty per cent of her complement. This is due to lack of funds for reconditioning it as the result of the failure of Congress to pass the cruiser bill.

In taking this action it was stated at the Navy Department that the *Florida's* boilers could be repaired temporarily but this would take all of the statutory limit of $300,000. This would not leave any money for other work on the *Florida* and at the same time take care of the rest of the fleet under the appropriations made by Congress.

It was pointed out that the department had asked Congress to authorize the modernization of the *Florida, Utah, Arkansas* and *Wyoming,* which included converting them from coal burners to oil burners. This authorization has not been passed by Congress. Even after its authorization, it will be necessary for the appropriation to cover this work to be made by Congress. Until the cruiser bill has passed and appropriations are made under it, the *Florida,* it is stated by the Navy Department, must be laid up.

But here comes the most alarming statement, and one which will provoke a bitter discussion in Congress.

"Temporary repairs have been made on the other three ships which will last about a year and a half."

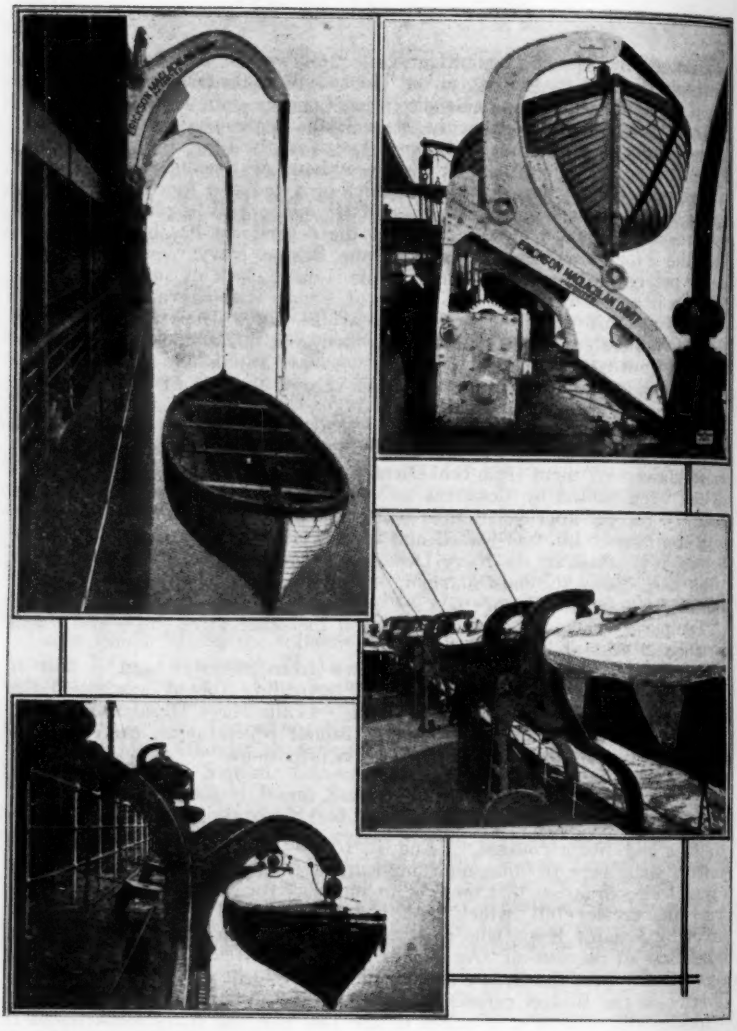
The only inference that can be drawn from this statement is that if Congress does not pass the cruiser bill providing for modernization the battleships will be placed in reserve status. If the Navy Department stands solidly behind this statement, Congress cannot refuse at an early date to pass the cruiser bill with its modernization provisions.

The Navy Budget

Army and Navy Journal, 2 August, 1924.—The Navy Budget for 1926 presents some very troublesome complications. The Director of the Budget, it is understood, insists that there is no authority for submitting the estimates under the cruiser bill, which passed the House and was held up in the Senate by Senator King, who took advantage of the parliamentary situation at the close of the session. As soon as Congress convenes the bill will almost automatically pass the Senate and go to the President for signature, but the Director of the Budget refuses to recognize the situation.

Incidentally, attention is called to the fact that the Navy Department is being called upon to go to the Director of the Budget two times for his approval of this bill. The bill was approved by the Director of the Budget before it was sent to the House Committee on Naval Affairs by the Navy Department at the beginning of last session. The Director of the Budget, in the usual formal letter, said that the bill was not contrary to the financial policy of the administration. Why the Navy Department should now be required to go again to the Director of the Budget for a second approval and wait until the Senate has gone through the formality of passing the bill is difficult to understand. The budget seems to be a system of delaying legislation for the Navy.

In this connection attention has been called to the astounding fact that there are still five submarines which were authorized in 1916 that have not been built. The beginning of this session there were six, but Congress made



THE ABOVE PHOTOGRAPHS SHOW THE METHOD OF OPERATION OF THE ERICKSON-MACLACHLAN DAVIT. UPPER RIGHT—THE APPARATUS INSTALLED, SHOWING THE DETAILS OF THE DAVIT, THE GRIPE WHICH HOLDS THE BOAT IN POSITION AND THE WINCH FOR LOWERING THE DERRICK AND BOAT DOWN THE GUIDES UPON WHICH THEY ARE HERE SEEN RESTING. NOTE THE ORDINARY DAVIT IN THIS PICTURE, WITH ITS CLUTTER OF ROPE AND TACKLE. LOWER RIGHT—THE METHOD OF STOWING BOATS WITH THE NEW DAVITS. NOTE THE GREATER DECK SPACE AND THE FREEDOM OF THE DECK FROM ENCUMBRANCES. LOWER LEFT—THE BOATS AND DERRICKS SLIDING DOWN THE GUIDES OVER THE SIDE OF THE SHIP. THIS PICTURE ILLUSTRATES HOW THE PENDULUM MOTION IS ELIMINATED IN LAUNCHING. UPPER LEFT—THE BOAT READY TO ENTER THE WATER. THE GRIPES ARE HERE SEEN HANGING AFTER HAVING BEEN RELEASED. THIS PICTURE ALSO SHOWS THE GUIDES, WHICH CAN EITHER BE BUILT OUT FROM THE SHIP OR MADE INTEGRAL WITH THE HULL AND EXTENDED DOWN TO ANY DESIRED POINT ON THE SHIP'S SIDE. IN THIS PHOTOGRAPH CAN ALSO BE SEEN HOW THE PRINCIPLE OF LOWERING RESEMBLES THAT OF AN ORDINARY ELEVATOR AND ENABLES A BOAT TO STOP AT ANY DECK ON THE WAY DOWN TO TAKE ON PASSENGERS.

appropriations for a sea-going submarine, the plans of which were approved two or three weeks ago by the Secretary.

MERCHANT MARINE

New Apparatus for Launching Lifeboats

The Nautical Gazette, 26 July, 1924.—One of the greatest problems that naval architects have had to solve in providing for the safety of life at sea is the devising of a means for insuring the quick and safe launching of lifeboats. No matter how many lifeboats a vessel may carry, they are useless in an emergency unless they can be launched and got away without danger to the persons who go in them. Shipowners realize fully the disadvantages of the present system of davits and its variations, and the risks attendant upon the launching of lifeboats under existing conditions are well known.

There has, however, been invented a system which meets all requirements for the effective launching of lifeboats from a stowed position on the boat deck, irrespective of the list of the ship. As shown in the photographs on this page the boats are attached to derricks to which rollers are attached. These rollers fit over guides which run down the side of the ship to any desired depth. The guides can be built out from the hull or be constructed integral with it. A gripe around the boat is fastened to a trigger and a single wire fall is led from the derrick to a winch on deck.

It will be seen that in this system the boats are lowered by gravity instead of the usual mechanical or manual power. The whole process of lowering a loaded boat can be accomplished easily by one man in from twenty to twenty-eight seconds. All that is necessary to complete the process is for the gripe around the boat to be released, and this automatically releases a trigger which leaves the boat ready for launching. The brake on the winch is then released and by their own weight both derrick and boat run down the guides to any desired position. The winch is of simple construction and of the double drum type, designed especially for this work.

Some of the advantages of this apparatus will at once be obvious. Of prime importance is the advantage that the pendulum motion of a lifeboat suspended at a great height over the ship's side is eliminated. It is well known that when a lifeboat is lowered from ordinary davits the boat will swing with the motion of the ship, thereby rendering the launching dangerous, since the boat is liable to be swamped by waves when it hits the water or to be crushed against the ship's side, and in the past many lives have been lost through this performance. With the new apparatus the whole derrick is lowered and this pendulum motion is thereby prevented, thus insuring the safe launching of the boat.

Another advantage is that the boat can easily be launched while the ship has an inboard list of from fifteen to twenty degrees. The pitch of the guides over the ship's side makes this possible. Moreover, no swinging out or reverse movement is necessary as is the case with ordinary davits, since the boat is launched direct from its stowed position. As the principle of lowering resembles that of an elevator the boat can be stopped at any position on the guides, thus affording the advantage that passengers can be loaded at any deck on the way down. No jamming is possible, neither can the boat be frozen in with snow and ice, as is often the case with ordinary blocks and tackle. The single wire rope which controls the lowering of the boat cannot become entangled and the elimination of blocks and tackle is a decided advantage.

As has already been indicated a lifeboat can be lowered by one man, a feature which is highly important in an emergency. The economical side of the use of the new apparatus is also noteworthy, since the device can be installed without the reinforcing of a ship's deck as it necessary with ordinary davits. Furthermore, as will be seen by the accompanying photographs,

a greater deck space is afforded since the apparatus takes up less room than the ordinary davits, and neither is the deck cluttered with tackle and chocks. Another feature is that the boats are stowed from six to seven feet above the deck, thus giving clear head room below, and, as the davits are arranged within the length of the lifeboats, there is considerable saving in fore and aft space occupied by the boats.

The first vessel to be fitted with this apparatus, which is known as the Erickson-MacLachlan Davit, is the new British liner *Tairea.* In the tests carried out on this ship, the time occupied from the releasing of the gripes until the boats reached the water—a distance of forty feet—varied between twenty to twenty-eight seconds.

British shipbuilders and owners are taking a keen interest in the apparatus, and some of the most prominent have given tangible proof of their faith in it by installing it on their new ships. A sister ship to the *Tairea,* now under construction by Barclay, Curle and Company, is being equipped with it, and it is being supplied to each of the two Orient liners being built by Vickers, Ltd., and John Brown and Company. The new passenger motor liner *Aorangi,* launched about a month ago for the Union Steamship Company, of New Zealand, by the Fairfield Shipbuilding Company, is to be equipped with this apparatus, and it is also to be placed on each of the three P. and O. vessels, two of which are being built by Barclay, Curle and Company, and the other by Alexander Stephen and Sons.

The inventor and patentee of the apparatus is Dan E. Erickson, well known in American shipping circles, who is now connected with the Todd Shipyards Corporation. In Great Britain the device was developed by C. D. MacLachlan.

America and Motor Ships

The Engineer, 11 July, 1924.—Some time ago it was announced that the United States Congress had voted the sum of $25,000,000 for the purpose of rehabilitating the commercial ships of the United States Shipping Board by converting the best of them into motor ships. A statement recently made by the Chairman of the Board, Mr. T. V. O'Connor, shows that 375 ships of the present idle fleet are considered suitable for this purpose. These ships, we learn, are well preserved and are on the average about five years old. They include hulls of varying types and sizes. It is expected that if the sum voted is judiciously spent over a period of years it will suffice to convert about sixty large ships aggregating approximately 600,000 tons deadweight. As a preliminary step in the extensive reconditioning program—as yet only outlined—the Board has tentatively selected twelve vessels of 8,800 to 9,400 tons deadweight capacity for conversion. Single-screw Diesel oil engine machinery of about 2,600 shaft horsepower, designed to give a service speed of 11 knots when fully loaded, is to be fitted. As far as possible standard types of machinery will be employed with electrically operated auxiliaries. The effect of the policy of the Board in selling its hulls at nominal prices should enable reconditioned ships to be placed in service at keenly competitive prices compared with new tonnage built in British and continental yards. The working of the scheme will be closely watched by British shipowning interests.

ENGINEERING

Refrigeration with Evaporated Water

The Nautical Gazette, 19 July, 1924.—The Westinghouse-Leblanc refrigerating system, which was originated in France, is noteworthy in that water is used as a refrigerating medium instead of CO_2 or the other usual mediums.

The principle upon which this system of refrigeration rests is illustrated in Figure 1. In this diagram (a) is a pipe connected to a nozzle (b) which latter has its axis coinciding with that of an ejector nozzle (c). The ejector body is provided with an opening (d). Assuming that steam under pressure is blown through the pipe (a) and its attached nozzle (b), the steam issuing from the nozzle (b) will expand, its pressure will be reduced and its velocity will be greatly increased. If it is further assumed that the end (e) of the ejector nozzle is open to the atmosphere and the opening (d) also communicates with the atmosphere, it will be found that, with the steam blowing through the ejector nozzle as above, the pressure at (d) will be approximately one-tenth of the pressure at (e). Taking the assumptions somewhat differently, let it be supposed that instead of opening to the atmosphere, the end (e) of the ejector nozzle is connected to a condenser. In this case, the same principle holds good and the pressure at (d) will be found to be roughly one-tenth of the absolute condenser pressure. It will thus be seen it is possible to obtain very high degrees of vacuum at (d)

FIG. 1

if a high vacuum exists at (e), and it becomes possible to cool water by partially evaporating it in a comparatively high vacuum.

The Westinghouse-Leblanc apparatus consists of an evaporator, which is a closed vessel, into which the water to be cooled is introduced at its upper end, after passing through a strainer, and is then showered down through the vessel. The upper end of the evaporator is also connected through the pipe (d) to the ejector nozzle. The end (e) of the ejector nozzle is connected to a condenser. A rotary pump is used to pump the water to be cooled into the evaporator and is driven by gears, electric motor, or a steam engine. It may be primed, upon starting, either by water under pressure or by blowing steam through the ejector nozzle, thus creating a partial vacuum.

The condenser is provided with an air pump which is connected to it at a point above the cold water inlet. The cold water entering the condenser showers down through it. The steam from the ejector nozzle passes up through the condenser, mixing with the descending water and is condensed. The resultant mixture of cold water and water of condensation is then removed from the hot well by a pump. The lower end of the

evaporator is connected with a brine pump which takes the cooled water and pumps it through the cooling coils in the rooms to be cooled. In the apparatus described, the brine, air and hot well pumps are all mounted on the same shaft, driven by the same prime mover.

Upon starting up, a vacuum is produced in the condenser and throughout the apparatus by the air pump. The water to be cooled is then pumped into the evaporator and the condenser cooling water pumped into the condenser. Steam is then turned on through the ejector nozzle. It will be noted that the water vapor evaporated in the evaporator is carried over into the condenser with the ejector steam, and both are there condensed in contact with the cooling water.

The cooling of the refrigerating water is accomplished solely by evaporation, and it is claimed for this system that due to the lack of reciprocating parts, there is very little wear and tear, no chemicals are used, and that it has a very light weight in comparison with other systems, it being claimed that for equal refrigerating effect its weight is about half of that of a CO_2 installation. A large number of French vessels have been equipped with this system of refrigeration, including a number of warships.

A New Mild Steel

Mechanical Engineer, August, 1924.—There is now in existence a mild steel with a higher elastic limit than ordinary mild steel. This elastic steel is the development of Mr. F. G. Martin, a metallurgist of Liverpool. This elastic steel has an elastic limit of sixteen tons to seventeen tons per square inch, as compared with eight tons for ordinary mild steel. Its ultimate tensile strength is thirty tons to thirty-five tons per square inch, not very different from the twenty-eight tons to thirty-two tons per square inch for ordinary mild steel. Its ductility is as good as that of ordinary mild steel, as evidenced by its elongation of twenty per cent in eight inches, and this is obviously an important attribute of it. The elastic steel is capable of withstanding continuous reversals of stress to a very much greater extent than ordinary rolled mild steel. It will withstand 10,000,000 reversals at a stress equal to its elastic limit of, say, sixteen tons, whereas ordinary mild steel will break down at about 1,000,000 reversals at a stress equal to its elastic limit of eight tons. The modulus of elasticity of the elastic steel is about eight per cent greater than that of ordinary mild steel. The cost of this steel is about twenty-five per cent greater than that of ordinary mild steel, but its price would drop as its use became extended, as was the case with ordinary mild steel.—G. W. Barr, F. G. Martin and A. T. Wall in a paper read before the Institution of Naval Architects, London, April 11, and published in *Engineering*, April 18, 1924, p. 510.

Advantages of Diesel Electric Drive

By L. Rothera, *The Nautical Gazette*, 19 July, 1924.—In the following remarks comparison is made between the direct Diesel drive and the Diesel electric drive on the one hand, and the turbo electric and turbine gear drive respectively on the other, and no attempt is made to compare the Diesel electric with the geared steam turbine drive, or vice versa. It has been assumed that the question of whether steam turbine or Diesel engine should be used has been settled, and the question then arises as to the comparison of the one or other with its electrical transmission.

As a result of a large number of comparisons made between the Diesel electric and direct Diesel drive, it has been found that in most cases a considerable saving in space can be made by adopting the former, the

percentage of saving in some instances being as much as twenty-five per cent.

As regards the saving in weight, this depends largely on the type of main engine used, as these vary very considerably among themselves. In a comparison recently made of three different types of engines, of which one was a four-cycle type, one an opposed-piston type, and one a two-cycle type, the saving in weight was respectively thirty-seven, seventeen and one per cent. The last figure, which puts the two drives almost on a par, is accounted for by the fact that a high-speed motor compressor was employed. Had the more usual direct driven compressor been adopted the saving in weight in the case of all three alternatives would have been considerable.

Taking the question of cost, there is an impression abroad that the Diesel electric is considerably more expensive than that of the direct Diesel. As against this a most careful comparison was made in a particular instance of a twin screw and single screw boat, putting the two forms of drive onto the same basis throughout, and the result showed in both cases a saving in cost on the Diesel electric compared with the alternative.

Comparison of the steam turbine electric with a geared steam turbine set shows a considerable saving in both space and weight, and in the case of a 20,000 h.p. boat, the length of the engine-room is fifty-one feet for the turbo electric and fifty-seven feet for a single reduction turbine, two turbines per shaft. The weight of the turbo electric drive is approximately three per cent less. The cost of the turbo electric drive is, however, greater than the gear drive, but against this can be set a number of advantages which are dealt with below.

As already mentioned, there is a distinct advantage in the space taken up, and in the weight of the electric drive as compared with the alternative forms of direct Diesel drive and steam turbine drive.

In addition to these can be mentioned ease of maneuvering, low upkeep charges, large factor of safety, steadiness of running, economy under all conditions of load, and the possibility of designing the propeller for the most efficient speed. The advantages claimed above may be amplified as follows when dealing with the Diesel electric as compared with the direct Diesel.

When altering speed or reversing, there is no need to interfere in any way with the operation of the generating sets, the whole operation being carried out by the control of the field of the generators by the movement of a single handwheel. This avoids the whole of the reversing gear on the engine and eliminates the necessity of the large compressed air receivers which are necessary to enable frequent reversal of a direct Diesel to be carried out.

The use of a small light continuous running Diesel engine should result in a very considerable reduction in upkeep charges on this portion of the plant, while the upkeep of the electrical end can be considered as almost negligible, the only points where wear takes place being at the brushes on the commutators and the bearing brushes. In a properly designed plant many years' wear of both brushes and bearings can be anticipated before renewal is necessary, and the cost of such renewal is trifling.

By producing the power necessary for each screw in two or more units, the failure of one will still leave available half power, which would enable the ship to proceed at approximately eight-tenths of full speed. In the same way the propeller motor can, if desired, be made up as a double-armature machine which has the incidental advantage of smaller diameter, although somewhat longer length, and a failure of any one-half will still leave half-power available until such time as repair is made. This reference

to the factor of safety is not intended to convey the impression that such failure is anticipated; sooner or later some difficulty is almost bound to occur, when the provisions set forth above will have their value.

A very much greater degree of steadiness in running is to be anticipated in the case of the electric drive, in that the speed of the propeller motor is practically uninfluenced by the load which it is carrying; thus racing of the screw when lifted from the water will be avoided and the re-entering shock minimized.

At first sight the fuel consumption of the Diesel electric drive appears inevitably higher than of the direct Diesel on account of the electrical conversion losses, which are in the neighborhood of twelve per cent. As against this loss must be set the possibility of choosing the most efficient propeller speed, which may represent a saving of five per cent, and the possibility of cutting down the propeller shafting to a minimum with a further possible two per cent or three per cent gain in efficiency.

In addition to the above savings, further economy can be looked for during such periods that the boat is operating at eight-tenths speed or less. As eight-tenths speed corresponds to half power, it is possible with a Diesel electric drive to shut down one of the generating units when operating at this speed and to run the remaining set at full-load at its best efficiency, whereas in the case of a direct drive the engine would be operating at half load or less.

[EDITOR'S NOTE.—The foregoing is an extract from a paper read before the Institute of Marine Engineers in England.]

Feed-Water Deaërators

The Engineer.—Feed-water deaërators are exhibited by two firms, Allen Sons and Company, Bedford, and Richardson, Westgarth and Company, of Hartlepool.

Water can be completely deaërated by creating violent ebullition and foaming, and in the Allen "Contraflo" deaërator this final effect is obtained by flashing the water, whereby it is shattered into minute particles, which allow for the complete liberation of the contained gases. This flashing can be accomplished either by heating the water under vacuum and flashing it on a surface of high temperature, or by first heating it in a separate vessel and then introducing it into a chamber under vacuum. The former arrangement, which is illustrated in Figure 1, permits the apparatus to be constructed in the form of a self-contained unit. The lower part of the deaërator contains a bank of steam-heated tubes, over which the water falls. Preliminary deaëration takes place in the upper part of the deaërator, where the incoming water is heated to the boiling point by the vapor rising from the hot tubular surface below. This hot surface acts like a low-pressure flash boiler, and when the falling water comes in contact with it, it is repeatedly flashed as it falls from one tube to another on its way to the outlet, and the contained air is completely liberated. The air rises and is withdrawn at the top by a small steam-operated ejector, which maintains a vacuum in the deaërator corresponding to the temperature of the heated water. The float contained in the base of the deaërator controls the inlet of the water, in accordance with the requirements of the boiler-feed pump.

The deaërator built by Richardson, Westgarth and Company, is known under the trade name of the "Eliminair" deaërator. It is automatic in operation and will reduce the oxygen contents of the feed to an amount that is practically immeasurable, by ordinary chemical methods.

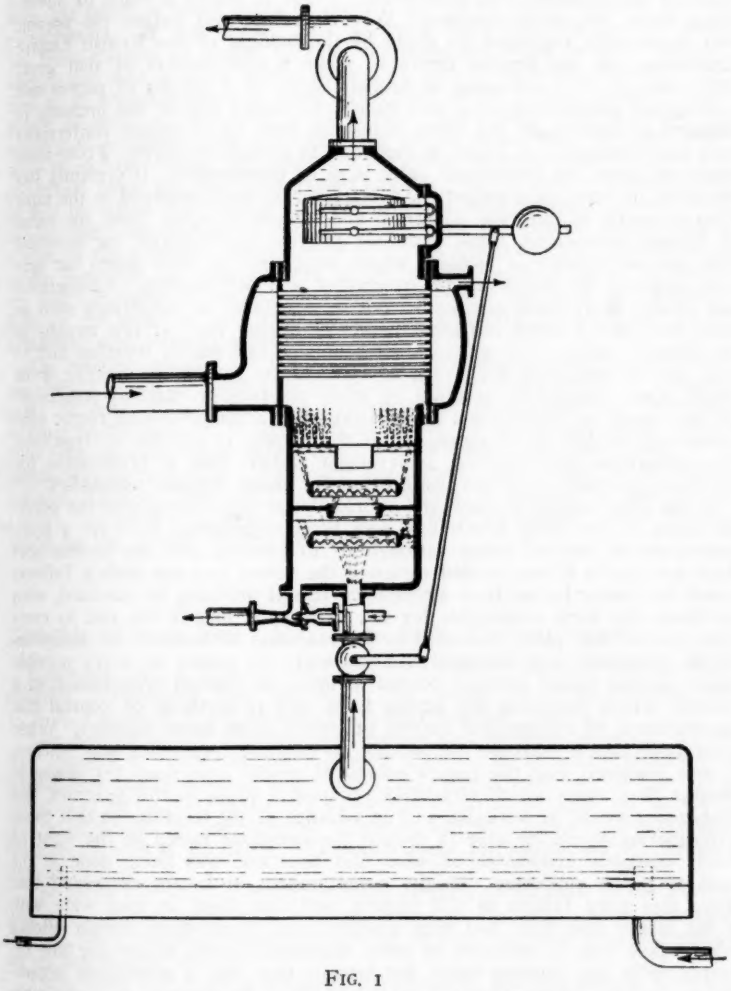


FIG. 1

ALLEN "CONTRAFLOW" DEAËRATORS

The World Power Conference

The Engineer, 18 July, 1924.—The conference habit is one to which mankind is now firmly addicted. Apart from the attempts to settle the economic problems of the world by means of recurring conferences—which is a habit of post-war politicians—the technical and business man has shown signs of falling more and more under the spell of conference organizations. We have had in rapid succession in London national or international gatherings of shipowners and shipbuilders, those connected with the textile, mining and metallurgical industries, and have gradually worked up to the super-confer-

ences of world power and advertising. There is indeed a touch of advertising about the whole business. What has happened during the present year is partially explained no doubt by the holding of the British Empire Exhibition and the general desire to make a real success of that great enterprise. If that end could be brought about by a torrent of papers and a deluge of discussions on a vast variety of topics and by the presence in England of leaders of the many industries with which recent conferences have been concerned, it might be regarded as already achieved. From some points of view, the conference habit is to be commended. It certainly has the effect of bringing together for a brief period those engaged in the same class of work in different countries, and altogether apart from the value of formal discussions, these occasions provide opportunities for informal talk and interchange of opinions which must tend to break down the barriers imposed by difference of nationality and self-interest. Competition and rivalry there must always be, but it is possible at gatherings such as those of which London has been the center during the last few months to fix lines of advance along which all countries can march together and to pool for the benefit of the world as a whole the results of scientific work which stand outside the confines of trade reserves or national possession. Of the extent to which these things have been accomplished at recent conferences it is difficult to judge, but if the danger is avoided of regarding the conference itself as the achievement rather than a preparation for future work, there is ample justification for these national assemblies.

From many points of view, the World Power Conference was the greatest thing of the kind which has ever been organized. It drew a large attendance of men of many nationalities to London, and the various sections into which it was divided reviewed the power problem with a fullness which has never before been attempted. It will probably be admitted, even by those who were responsible for the conference, that in the end its complete success was partly thwarted by the readiness with which the invitation of the promoters was accepted. An avalanche of papers on every possible aspect of the power question poured in upon the central organization in a manner which suggested the letting loose, before methods of control had been devised, of unsuspected sources of energy from many quarters. When little more than a year ago the decision to hold the conference was reached, it was imagined that the papers submitted would have been far fewer in number than those which ultimately occupied a place in the program, and that copies would be available well in advance of the meeting, so that those participating would be able to discuss the questions raised in the light of fairly complete knowledge of what had been and was being done in the field of power resources. In the circumstances, it is not surprising that there was some failure in this respect, and that faced as they were with a far larger task than had been contemplated, there were certain hitches which gave rise to criticism in some quarters. These things are not referred to in any captious spirit, but because now that a permanent organization to hold future Power Conferences is to be formed, it is desirable that the small blemishes which to some extent marred the arrangements for the conference which has just ended should be made impossible. Turning to the work of the congress, as our reports have shown, a very wide field was opened up, and it was made clear that the world's power resources are greater than was imagined, and that solid, if somewhat slow, progress is being made in the elucidation of the technical questions which must receive consideration if the best use is to be made of the assets which Nature has placed at the disposal of man. Perhaps the outstanding features of the conference were the revelation given of the careful survey of the world's fuel resources which is being carried out, the attempts to utilize these fuels and to harness water power on economic lines, and the

wide use which is being made of electric power for industrial and general requirements. It was shown that in many countries super-power zones fed from stations of almost national character are being brought into existence, and that in some instances, notably that of Holland, the electrification of an entire country is being attempted, while in other cases electric power is being exported by a submarine transmission system from one country to another. The account given of the conversion of steam railways to electric traction indicates that the steam railway is, under favorable conditions, being gradually superseded and the trend of policy foreshadowed is that by which current for railway working will be supplied, not from special plants erected for the purpose, but from the general power supply system of the country. Other sections of the Congress gave consideration to the improved and extended use which is being made of power in industry and for domestic use and in agriculture, while questions of education, both on the technical and commercial side, industrial welfare and standardization also received attention.

The speeches made at the final session of the Congress made it clear that the world's power problem is being approached in a new spirit of cooperation. It only remains for the ambitions outlined during the Wembley meeting to be brought to actual achievement by the steady work which must now be undertaken in all countries. Viewed from this aspect, it is satisfactory to note that a beginning has already been made by the International Electro-Technical Commission, which is holding a meeting in London this week to consider the wider field of work opened to that organization by the World Power Conference.

AERONAUTICS

Dirigible "Shenandoah" Moored to Steel Mast on Vessel

Baltimore *Sun*, 9 August, 1924.—Newport, R. I., August 8.—The navy dirigible *Shenandoah* was moored to the special mooring mast on the U. S. S. *Patoka* at 8 o'clock tonight, in Narragansett Bay.

The mooring of the dirigible was accomplished in about an hour. There was scarcely a ripple on Narragansett Bay when at seven o'clock the *Shenandoah* slowly dropped down and let fall about 1,000 feet of line. This was picked up by the *Patoka* and slowly drawn in to the mast on the stern. The point picked for the mooring operation was off Prudence Island, where the tide rip was at its lowest. Prospects were for almost perfect weather tonight.

The entire operation of tying the great aircraft to the mast of the *Patoka* was accomplished apparently without untoward incident. After dropping the line, the *Shenandoah* was maneuvered so that the cable could be picked up on the mother ship.

Then, with the mother ship and the dirigible drifting slowly with the turn of the tide, the *Patoka* maintaining just enough headway to keep into the light wind, the cable was hauled in. Two or three times the *Shenandoah* discharged ballast, dipping and rising as she was drawn in to the mast on the *Patoka's* stern.

Should conditions remain favorable the test will be continued three days to try out thoroughly the stability of the mast and the effect of mobile mooring on the duraluminum frame of the airship. If the test proves satisfactory the *Patoka* will be the sea anchorage of the dirigible in subsequent movements of the fleet.

Helium, Hydrogen and Sanity

Aviation, 21 July, 1924.—Considerable publicity has appeared in recent months for and against the use of helium for airships. As far as we have been able to discover, no one having the knowledge of airship operation is against helium except for specific purposes where its use would introduce more danger than it saves.

In these arguments the same illustrations are invariably brought forth of the *R-38,* the *Roma* and the *Dixmude,* but omitting to mention the fact that the *R-38* catastrophe was due to structural failure of the ship, the *Roma* due to collision with the ground, and the *Dixmude* due to shortage of fuel, there being no conclusive evidence in the latter case that fire had anything whatever to do with the loss of the ship.

If these rare and unusual accidents are to be used as arguments, it should, in all fairness, be admitted that none of them were due to the use of hydrogen gas. In all three cases the ship would have been lost in any event, and in the last case the chances with the less efficient helium would have been decidedly less.

Why not be fair both ways and grant that helium in a fabric airship reduces the risk of fire, and makes it easier to save the crew if a fire should occur? Grant also that helium provides a cruising range of only one-half that that can be obtained from use of hydrogen. Aside from economic questions this is the whole story and furnishes a ready means for determining which to use for any particular purpose.

Wright T3 Engine Passes Rigid Duration Test

Aviation, 14 July, 1924.—The Wright Model T3 high compression engine recently completed a standard Navy Fifty Hour Test, developing the highest mean effective pressure that has ever been recorded on such a run. Moreover, this is the lightest engine for the power developed in the world, weighing 1.7 lb. per developed horsepower on test. Not only did this engine finish the run with five hour developing 680 hp. at 2,000 r.p.m., but it showed remarkably low average fuel and oil consumptions, the fuel consumption on the nine-tenths run being 0.47 per hp. hour and the average oil consumption for the entire run being 0.0065 lb. per hp. hour.

The engine was taken from the production run of T3 engines now going through the plant for the Navy, and after its regular test runs covering a period of sixteen hours, power curve runs were made to determine the characteristics of the engine and it was then put on a fifty hour test with the rated power of 650 hp. at 2,000 r.p.m.

The standard navy tests consist of ten five-hour periods, nine of which are run with the first four and one-half hour at nine-tenths rated power at the rated speed, with one-half hour at the end of each period at the rated power and speed. The tenth, or last five hours, is run with throttles wide open at the rated speed.

Instead of running in the usual manner, with the power corrected for the temperature and barometer, this run was made with the engine developing the power required by the navy test uncorrected, which was considerably more severe than is required, as the engine developed from ten to fifteen more horsepower throughout the test than was necessary. The whole run was made in sixty hours elapsed time, there being only two stops, one at the end of twenty hours to replace a defective oil line, and another toward the end of the run to replace defective spark plugs. Considering that this was a high compression engine, with 6:5:1 ratio, running at 2,000 r.p.m., this was a remarkable test.

The averages for the test are given in the following table:

RESULTS OF 50 HOUR TEST OF WRIGHT T3 ENGINE

Averages	*Cor. hp. 2,000 r.p.m.*	*Fuel Cons. lb./hp./hr.*
9/10 power running	602	0.470
Rated power running	670	0.528
Last 5 hr. running	680	0.548
M.E.P. developed on last 5 hr.		138½ lb.
Oil consumption for 50 hr.		.0065 lb./hp./hr.
Weight of engine, dry		1,155 lb.
Weight per horsepower		1.70 lb.

A disassembly inspection of the engine showed that all the major parts were in excellent condition, so much so, that the engine was built up again and put on another test for experimental purposes.

The successful completion of this test, in addition to the remarkable racing records of the experimental models of this engine developing 750 hp. at 2,200 r.p.m., show that this power plant is really capable of being used in two entirely different kinds of service, that is, in pursuit and observation planes, as well as large bombers and flying boats. In the high speed service, the tremendous power available, together with the low weight per horsepower and small frontal area of the engine, make it particularly desirable. For the large ships particularly, its low fuel and oil consumptions, coupled with its durability, make it particularly satisfactory.

Test of Radio Direction Finder

Army and Navy Register, 19 July, 1924.—Captain W. H. Murphy and Lieutenant A. J. Lyon, of the Army Air Service, recently made a flight from McCook Field, Dayton, Ohio, to Columbus, which proved to be the first use of the radio direction finder under actual necessity. The weather was extremely foggy and Lieutenant Lyon, the pilot, who had never flown with the aid of a radio direction finder, was not exactly sold on the efficiency of the proposition. Hence the trip was started by compass. The fog was so thick that the plane had to be kept hovering just over the tree tops. Not a landmark was visible. This, together with a variable drift wind, soon made it apparent that Columbus would scarcely be reached without some other aid. The plane was the Radio DH, *P-292*, and as soon as the equal radio signal direction finding system was taken into confidence, the plane was set on the correct course, and Columbus was reached without difficulty. There was no question as to its use on the return trip. It simply was used and the result proved equally successful through as persistent bad weather and as stubborn drift winds. The compass was, of course, forgotten, as it was found to be reading incorrectly. Captain Murphy made an interesting experiment on the return trip which leads to the idea that should two planes be traveling the same course—one, for instance, flying from Dayton to Columbus and the other from Columbus to Dayton—they could each keep slightly to the right of the course, thus avoiding collision and still be led to their destinations with great accuracy.

Air Navigation

Infantry Journal, August, 1924.—It is within the memory of living men that the government was severely criticized on the floor of Congress for daring to suggest that public funds be appropriated for the development of the "flying machine."

As late as 1905, Representative Robinson of Indiana in the House attacked bitterly the War Department's policy in spending money to aid in the development of the Langley airship. He said the department had put $100,000 into a project "which every sensible man knows has no utility." He continued: "Here is $100,000 of the people's money wasted on this scientific aerial navigation experiment because some man, perchance a professor, wandering in his dreams, was able to impress the officers that his aerial flight scheme had some utility."

Since that time much water has run under the bridge.

PROGRESS OF ROUND THE WORLD FLIERS

With the coming of this fiscal year we see the Post Office Department providing an air mail service across the continent, which makes the trip in a little more than thirty hours.

Today the east and west coasts are closer together than were Philadelphia and Washington a century ago.

The next step in the development of aviation in this country will be the safe transportation of passengers from coast to coast in half the time that it now takes, and we predict that the day when this will be an accomplished fact is not far distant.

For these wonderful developments the Army Air Service must be given credit in large measure.

ORDNANCE

British Protest U. S. Gun Elevation Plans

Army and Navy Journal, 2 August, 1924.—A cable from London announces that the British Government has made representations to the governments of the United States and Japan that the alteration of the elevation of guns in capital war vessels, or expenditure for the purpose of increasing the radius of action of these guns, would be, in the opinion of the British Government, a breach of the Washington Convention. Thus does Great Britain come out openly against the modernization of the American Navy by which the fleet would have the same range of fire as that of the British fleet.

When this matter was up before in Congress and the State Department no representation had been made to the American Government that the proposed change in the elevation of the American guns would be contrary to the treaty.

It was asserted at the State Department that no protest had been made by Great Britain, but that the British Government had insisted that the American naval authorities had acted upon misinformation as to what had been the policy of the British Admiralty on the subject.

In all probability the orginal intention of the Secretary of Foreign Affairs was to prevent this improvement in the American Fleet. It must now be apparent that the British Government does not propose to permit a modernization of the American Fleet or the elevation of its guns if it can prevent it. In this, of course, the British Government will have the aid and comfort of the American pacifists and politicians. Its former representation was only for the purpose of gaining time, and they accomplished their purpose with the aid of a timid Congress.

The protest was timed to the minute. It comes when the naval authorities are working on next year's legislative program and the budget. If the question of the elevation of the guns can again become involved in a lengthy diplomatic conversation another session of Congress will go by without the authorization and appropriation for this improvement. This will give the British Fleet a superiority for at least another year and by that time the astute English diplomats will probably be able to raise another question which will secure a farther postponement of the time when even the capital ships of the American Fleet will be on a parity with the British Fleet. America always loses at the diplomatic table.

In his last annual report the Secretary of the Navy recommended an authorization by Congress of the elevation of the guns of thirteen of the American battleships. He took the position that this was not contrary to the arms treaty, and cited a memorandum by Frank H. Schofield, U.S.N., which was included in the report as an appendix. Captain Schofield's memorandum was written after conferences with the members of the general board and represents what may truly be termed an American expert opinion. He dealt with the subject in a masterly way and made what appears to be an unanswerable argument.

Captain Schofield pointed out that the only words in the treaty that bear up on the proposed elevation are as follows:

"No alteration in side armor, in caliber, number or general type of mounting of main armament shall be permitted."

He then enumerated the five necessary steps in increasing the elevation of the turret guns of the thirteen of our battleships that are under consideration. These steps are:

(1) Increasing the size of the gun port opening.

(2) Lengthening the elevating screw so that the breach of the gun may be lowered and raised through a greater distance.

(3) Cutting away some of the plates and framing under the breach of the gun so that the breach may be lowered further.
(4) Changing the position of the ammunition hoists slightly.
(5) Making a more powerful counter recoil system.

Taking up each of these steps he demonstrated clearly that they do not amount to an "alteration in side armor, in caliber, number or general type of mounting of main armament." He pointed out that the increase in the size of the gun ports would not change the mounting or general character of the guns but would simply be a matter of enlarging the holes in the armor while the mounting remained the same. The lengthening of the screw does not change the type of the mounting of the gun. The same type of mounting is preserved. The size of the screw does not change the general type of the mounting.

The third step of cutting away the plates on the breach is practically on the same basis as increasing the size of the gun ports. Changing of the position of the ammunition hoists forms absolutely no basis for a protest, and a fifth step of the more powerful counter-recoil system cannot be construed as an alteration of the general type of the mounting of the gun.

The captain should have gone on and stated that the amount asked for, for this improvement on the guns of thirteen capital ships is an assurance in itself that the guns are not to have a new type of mounting as prohibited by the treaty. No such improvement could be made in all of the turret guns of the thirteen battleships for $6,500,000.

Much was said in Congress, by the opponents of this part of the modernization of the fleet, of the "spirit of the treaty." The real spirit of the treaty and its announced purpose was to give America and Great Britain fleets of equal strength. The strength of a fleet is based largely on its gunfire. It is not determined by the range of one or two ships but by the average range of the entire fleet. If it is admitted that the United States had not the right, under the treaty, to bring the range of the guns of its battle fleet up to that of the British Navy, what becomes of the 5-5-3 ratio? It ceases to exist and the American Fleet drops into second place. If the British Government is able to maintain its attitude toward the subject of modernizing the American Fleet, the United States was more disastrously defeated at the arms conference than it was first presumed by the opponents to the agreement.

In the course of his annual report, when he recommended an appropriation for the elevation of the guns, former Secretary of the Navy Denby said:

"It is quite obvious that in a fleet action all the vessels of a fleet cannot be firing upon the enemy until the enemy is under fire by the ships of shortest range. In such a fleet action we would have seven ships that can fire slightly over 20,000 yards, whereas the ships of shortest range in the British Fleet, according to the British naval writer, Mr. Bywater, can fire 23,000 yards, making a difference of practically two miles. In other words, if the British remained at a range just equal to their shortest-ranged ships, the fire of over a third of our ships could not reach them. This would automatically reduce the size of our fleet by one third. Expressed in terms of elevation of guns, the thirteen ships of the American Navy have a designed elevation of fifteen degrees, whereas none of the twenty-two ships of the British Navy has less than twenty degrees, thus leaving the American ships much inferior in this regard to those of Great Britain."

It requires no elaborate study to understand how vital the elevation of thirteen of its battleships is to the strength of the American Navy. If the American Government yields on this point, it might as well give up any pretension to maintaining a treaty Navy. The issue is clearly drawn as

Secretary of the Navy Wilbur stated in reference to the protest of the British Government:

"I hope that the question is settled so that we can go to Congress with our recommendations without any diplomatic complications."

America's Inferior Battle Fleet

Washington *Post*, 31 July, 1924.—The British Government has advised the United States and Japan that in its opinion the alteration of elevations of guns on capital ships or expenditures for the purpose of increasing the radius of action of these guns would be a breach of the arms limitation treaty.

What Japan will do in the face of this representation remains to be seen, but it is a certainty that the United States will not accept the view of the British Government.

At present the battleship fleet of the United States is inferior to the British and Japanese fleets, taking into consideration the factors that make up fighting strength. Some of the foreign vessels are of greater tonnage; some are speedier; others have bigger guns, and others have greater elevation of guns, giving them superior range. Only two of the American battleships can be regarded as the equals of the best foreign battleships, and many American experts have their doubts even on this point, on account of the slower speed of the American ships.

The arms limitation convention attempted to fix the ratio of battleship strength of the three leading naval powers as follows: Great Britain, 5; United States, 5; Japan, 3.

No unbiased naval expert, here or abroad, will contend that the American battleship fleet equals the British Fleet in fighting ability, or that the American Fleet is superior to the Japanese at the ratio of 5-3.

The only means available for modernizing American battleships, to keep them measurably up to the ratio of strength to which they are entitled, is by elevating the guns, increasing the armor protection against submarine and airplane attack and equipping them with anti-aircraft guns.

The arms limitation treaty does not forbid these alterations. On the contrary, it permits some of them specifically, and at least by inference it permits them all. The treaty provides that no retained capital ships shall be reconstructed except for the purpose of providing means of defense against air and submarine attacks. The relevant paragraph then adds:

"No alterations in side armor, in caliber, number, or general type of mounting of main armament shall be permitted except: (1) In the case of France and Italy, which countries within the limits allowed for bulge (elsewhere provided for in the treaty), may increase their armor protection and the caliber of guns now carried on their existing capital ships so as not to exceed sixteen inches (406 millimeters), and (2) the British Empire shall be permitted to complete, in the case of the *Renown*, the alterations to armor which have already been commenced, but temporarily suspended."

It is asserted that both Great Britain and Japan have elevated some of their big guns since the treaty became effective; but this has been denied, and the point is in doubt; however, there is no doubt whatever that the big guns of both foreign fleets are elevated, as a rule, higher than the guns of the American Fleet, so that the effective range of most of the foreign guns is much greater than that of the American guns. This advantage, combined with the greater speed of the foreign ships, entirely destroys the ratio agreed upon and relegates the United States battleship fleet to third place in fighting efficiency.

If the United States should attempt to replace its semi-obsolete 14-inch guns with 16-inch guns, or if it should attempt to increase the number of guns, or if it should reconstruct its ships to give them greater speed, there might be a question raised as to violation of the treaty; but it is obvious that and that when foreign fleets are demonstrably stronger and more effective the treaty contemplates the maintenance of the ratio of strength agreed upon, than their ratio strength, the American Fleet should be modernized to keep pace with the general advance.

It is proposed to convert some of the American coal-burning battleships to oil burners. No protest has been made by any foreign government against this improvement, as it is apparent that coal-burning battleships cannot keep up with squadrons composed of oil-burning ships and are therefore ruled out of any naval operations on a grand scale.

The conversion of range of guns by elevating them is not a reconstructive process. It is a poor substitute, in fact, for newer and bigger guns; but it is the best the United States can do in the circumstances.

There should be no quarrel between this and any other government on this subject. The arms limitation treaty provides for its amendment in amicable conference whenever "the requirements of the national security of any contracting power in respect of naval defense are, in the opinion of that power, materially affected by any change of circumstances." There are changed circumstances, caused by the increased strength of foreign fleets, striking at the heart of the treaty's main object. Therefore the United States is fully entitled to ask for a conference for the purpose of reaching an agreement for the modernization of its battleship fleet, to make it the equal of the British Fleet and the superior of the Japanese Fleet by the ratio of 5-3.

U. S. Welcomes Gun Protest from Britain

Baltimore *Sun*, 31 July, 1924.—Washington, July 30.—Disclosure in London today that the British Government has made formal representations to the United States and Japan, contending that, in its opinion any increase in the elevation of the guns of existing battleships under the flag of any nation signatory to the Washington Naval Limitation Treaty would be a breach of that treaty gave an entirely new aspect to the discussion of this subject, which has been in progress in this country for two years or more.

The announcement was met with complete silence on the part of the officials at the State Department, but at the Navy Department, Secretary Wilbur, speaking on the basis of press reports and not upon any official representations he may have seen, declared that "it is a good idea to have the question raised in order to have it settled." The announcement in London, it is believed in this connection, has served to give the question a diplomatic status it has not before known.

So far as known the Washington Government has taken no steps toward replying to the British representations. It is believed that the communication referred to in the House of Commons by Arthur Ponsonby, Under Secretary for Foreign Affairs, was transmitted several weeks ago at least. In view of this it is evident that the Washington Government sees no reason for urgency in dealing with the situation.

The announced purpose of the Navy Department is to resubmit to Congress at the next session its full program for modernization of the older battleships of the American Navy. That program includes elevation of turret guns to give them modern battle ranges. At no time has the Navy Department, despite a very extensive study by the general board of all the proceedings of the Washington Conference, and its committee and

experts, conceded that the provisions of the treaty could fairly be interpreted to prohibit the modernization work it has repeatedly recommended to Congress.

The British communication is believed to be based on a provision of Section 1, Part 3, of the treaty, which prescribes replacement rules and says with reference to existing battleships:

"No alterations in side armor, in caliber, in number or general type of mounting shall be permitted."

Exceptions to this qualification are made to permit France and Italy to increase their armor protection and the caliber of guns to the treaty limit of 16-inch weapons, and also for the British to complete armor alterations on the battle cruiser *Renown* which were in progress when the treaty was drawn.

Officials familiar with the proceedings of the Washington Conference experts' committee, which framed these technical rules embodied in the treaty, have indicated that the rule quoted above was adopted on suggestion of the British experts and for the specific purpose of rebuilding old battleships under the guise of reconstruction work. The object aimed at, it has been said, was to make it impossible to replace 12-inch guns on old ships with 16-inch weapons, completely changing the military characteristics of the vessel involved. The phrase "general type of mounting" in the treaty rule would apply in such a case, it is said, as an entirely new mounting would have to be installed to accommodate a gun of larger caliber than that of the weapon for which the original mounting was designed.

It is known that the application of wording in the treaty to the proposal of the Navy Department to raise the gun elevations on older ships was fully considered by the navy general board before the original recommendation for a modernization board was made to Congress.

It was the conclusion of the General Board and of the Navy Department, arrived at in conference with the officers and officials who represented the United States in the Washington Conference experts' committee, that the rule did not apply against the relatively simple alterations of existing mountings which would be necessary on these American ships. It was held that no change in general type of mounting was involved and that the purpose of the rule was not aimed at restricting the improvement of old ships so as to obtain the greatest possible efficiency from their existing equipment.

Appropriations to make the gun elevation changes in certain cases were granted by Congress when first sought by the Navy Department. Subsequently, however, some question was raised as to the effect of the treaty, and the administration decided not to proceed with the work until it had made certain that Congress fully understood and approved the project. The renewed recommendation to Congress by Secretary Denby for authorization and funds to do the work followed, but the House after a sharp fight eliminated from the bill the item for gun elevation.

The comparative status of the British and American battle fleets in the matter of range comes down to a question of individual ships, it is said, as in both navies there is a wide range of difference between vessels. Extreme ranges vary from 20,000 to 35,000 yards. One group of four or five of the newest American craft probably outrange substantially all of the British vessels, but on the other hand and because of post-war alterations made before the Washington Conference was held, a larger group of British ships outranges the balance of the American battle divisions.

The average range is said to be well in favor of the British and it was in part to correct this situation that the American modernization program was formulated. The work necessary has been described as consisting

merely of cutting higher gun ports in turrets to permit gun muzzles to be elevated and installation of longer screw elevating gears.

One part of the statement made by the British Under Secretary today is not understood by naval officials. He indicated that British opinion also held that any expenditure to increase the radius of action of battleship guns was forbidden by the treaty. Just what he had in mind and to what section of the treaty he had reference was not known here. Taken literally, his words would mean that development of a new type of powder, which would give greater range to the guns, would be forbidden or that any other change of projectiles or firing mechanism for the same purpose would be outside the treaty.

It is believed the Under Secretary hardly could have intended to convey such an impression as the British ships have recently been experimenting with methods of "tilting" the ships themselves to obtain greater gun elevation and range by pumping water into the "blister" anti-submarine construction on the sides of the ships, making them heel over. Such work costs money and under a literal interpretation of the statement to Parliament, it was said, would not be permissible under the treaty in the British view.

In any event, it is evident that no haste is necessary in dealing with the British communication, as the Navy now lacks both authority and appropriations to increase gun elevations, and the proposal cannot be resubmitted to Congress until that body reconvenes, probably at its regular session in December. Nor do navy officials believe that the expression of the British viewpoint can materially affect the American program, since it has been understood that the three other signatory powers in all likelihood would share the American viewpoint in their interpretation of the treaty rules and would not assent to the British argument.

There is some feeling that political conditions in Great Britain are more responsible for the representations than is the British Admiralty. Officers who were familiar at the time with the views of the British experts sent to Washington for the limitations conference do not believe they would contend that the prohibitory rule they urged was designed to prevent such an increase of gun range as that which the Navy Department has twice recommended to Congress. If British naval officials had taken that view of the treaty, it was pointed out, there would almost certainly have been formal representations on the subject to the Washington Government at the time Secretary Denby made his original recommendation that the older ships be brought up to date in this regard.

The British Government has made representations to the governments of the United States and Japan that the alteration of the elevations of guns on capital war vessels or expenditures for the purpose of increasing the radius of action of these guns would be, in the opinion of the British Government, a breach of the Washington Convention.

This declaration was made in the House of Commons today by Arthur Ponsonby, Under Secretary for Foreign Affairs, in answer to a questioner who asked whether any representations on this point had been made to any of the signatories of the Washington Convention.

NAVIGATION AND RADIO

Short-wave Radio Communication

Engineering, 4 July, 1924.—In view of the fact that the earliest experiments on the propagation and reception of electric waves were carried out by Hertz with waves only a meter or so in length, it is perhaps rather remarkable that the subsequent utilization of these waves as a practical

means of communication over long distances has been almost entirely confined to waves of several hundreds, of even thousands, of meters in length. Hertz himself showed that electric waves could be reflected, and it is obvious that a more or less parallel beam of waves produced by reflection would have considerable advantages over waves radiated equally in all directions, particularly in reducing the power required to cover a given distance, reducing interference between different stations, and reducing the possibility of messages being picked up by unauthorized persons. For reflection to be possible, however, short waves are essential, since the aperture of the reflector must be equal to at least three or four wave-lengths. It would thus be impracticable to construct a reflector to deal with the waves varying from 1,000 meters to 25,000 meters in length at present used in long-distance radiotelegraphy.

The beam system, employing short waves and reflectors, was employed by Senator G. Marconi in some of his experiments in this country over twenty-eight years ago, and the advantages of the system were further referred to by him in a paper before the Institution of Electrical Engineers in March, 1899. Since that time, until comparatively recently, however, but little research work on the application of short waves to radio communication has been carried out. This apparent neglect was largely due to the difficulty of producing short waves of sufficient power, and also to the supposed high attenuation of the waves when transmitted over any considerable distance of land or sea. The difficulties of producing and receiving these waves have now been practically overcome by modern valve apparatus, and that many of the objections raised to their use were more apparent than real has been amply demonstrated by the recent experimental work of Senator Marconi and Mr. C. S. Franklin. Some particulars of this work were given in an interesting and important paper read by the former before the Royal Society of Arts on Wednesday last.

The most important of the experiments described were carried out between Poldhu in Cornwall and the steam yacht *Elettra* in various localities, the wave-length used being of the order of 100 meters. These experiments, in Senator Marconi's opinion, prove that the general impression prevailing among experts as to the behavior of short waves is erroneous in several important respects. For the wave-length mentioned, the observations indicate that the day ranges are reliable and considerable, and that the night ranges are much greater than had been anticipated. It was also demonstrated that intervening land did not present any serious obstacle to the propagation of the waves. Another important fact has transpired with respect to day ranges; it has been established that the strength of signals received during the hours of daylight varies definitely and regularly in inverse proportion to the mean altitude of the sun above the horizon in the region intervening between the transmitting and the receiving stations.

In one series of tests referred to in the paper, the transmitting apparatus at Poldhu consisted of eight standard M.T.2 valves worked in parallel, the input to the valves amounting to twelve kilowatts. The radiation obtained was about nine kilowatts at ninety-seven meters wave-length. With a parabolic reflector directed toward Cape Verde, the measured signal strength in that direction proved to be equal to that which would have been received from an aerial radiating 120 kilowatts without a reflector. After preliminary tests carried out on the *Elettra* in Falmouth Harbor, the vessel proceeded to Cape Finisterre, and a series of tests was carried out with the reflector at Poldhu dismantled. After rounding Cape Finisterre, it was anticipated that the intervening land would have cut off signals during the daytime and greatly weakened them at night, but this was found not to be the case. Signals, however, were weakened during the day according to the

distance and to the altitude of the sun, but were clearly received off Seville, which is 780 miles from Poldhu, after having traversed practically the whole of Spain consisting of over 300 miles of high and mountainous country. Night signals were always particularly powerful. Good signals were afterwards secured in daylight at Gibraltar, Tangiers and Casablanca, the latter situated 970 miles from Poldhu.

For the subsequent tests, the reflector at Poldhu was brought into use, and the yacht proceeded to St. Vincent, Cape Verde Islands, where it was found that reception was still possible in daylight for a few hours after sunrise and for some time before sunset, although the anchorage was partially screened by mountains; the distance covered was about 2,230 nautical miles. Night signals could always be received at St. Vincent even with the receiving aerial disconnected. The strength of these night signals was estimated at eighty to one hundred microvolts per meter length of the aerial, and with this signal strength no trouble was experienced from atmospheric disturbances. The power of the Poldhu transmitting station was then gradually reduced from twelve kilowatts to one kilowatt, and even with the latter power, Senator Marconi stated, the signals received at St. Vincent were stronger than would be necessary for commercial communication. The signals with one kilowatt were, in fact, considerably stronger than those received from Carnarvon or from any other high-power European or American station. As a result of these tests, Senator Marconi is satisfied that reliable commercial services for a considerable portion of the twenty-four hours of a day could be carried on over distances of at least 2,300 nautical miles using only one kilowatt of energy at the transmitting station.

On the conclusion of these experiments, which were carried out in April and May of last year, the transmitting apparatus at Poldhu was improved and the power increased to about twenty kilowatts. Further experiments have been carried on since February of this year, at first with a short-wave receiver installed on the steamship *Cedric* and employed on a journey to New York and back. No reflectors of any kind were used for the experiments which were carried out on a wave-length of ninety-two meters with an input-power of twenty-one kilowatts giving a radiation of about seventeen kilowatts. The results showed that signals could be received in daylight up to a distance of 1,400 nautical miles. Signals of great intensity were received at Long Island during periods of darkness extending over the whole distance between the transmitting and receiving stations, and of less intensity when the sun was above the horizon at either end. The variation of the intensity of the received signals inversely as the mean altitude of the sun above the horizon, was amply confirmed. In connection with these tests it is particularly interesting to note that the signals transmitted from Poldhu were received quite clearly in Sydney, N.S.W., every day from five P. M. to nine P. M. G.M.T., and also between six-thirty A. M. and eight-thirty A. M. At Montreal, good reception was found to be possible for sixteen hours out of the twenty-four.

In consequence of the rather unexpected reception of those signals in Australia, it was decided to attempt to communicate with that country by wireless telephony. For this purpose, the power was further increased to a total of twenty-eight kilowatts, of which eighteen kilowatts was supplied to the main oscillating valves, eight kilowatts to the modulating valves, and two kilowatts to the drive valves, the object of which is to keep the wave-length steady. The wave-length used was again ninety-two meters, and no reflectors were employed. In spite of the fact that the apparatus used was of a rather experimental character, ordinary speech transmitted from Poldhu was successfully received on May 30 last, the date of the first attempt. This is certainly a very remarkable achievement in view of the

low power employed; and is one which marks a most important stage in the development of radio communication.

The various problems connected with the production of short-wave commercial transmitters capable of dealing with powers up to about fifty kilowatts, Senator Marconi stated, had now been solved, so that the construction of the necessary apparatus presented no difficulty. He added that while no reflectors had been employed in the long-distance experiments above referred to, their use would enormously increase the effective strength of the signals. In this connection he mentioned some experiments carried out a few weeks ago between Poldhu and Buenos Aires, a distance of 5,8 0 nautical miles. With a twenty-one kilowatt input and using the same wave-length of ninety-two meters in conjunction with a parabolic reflector directed towards South America, very strong signals were received in Buenos Aires over ten hours each day. The radiation in the direction of South America was found to be equal to that from an ordinary aerial radiating about 300 kilowatts.

In conclusion, Senator Marconi expressed the opinion that with comparatively small stations of the type referred to above, a far greater number of words per twenty-four hours could be transmitted between England and her distant dominions than would be possible by means of the high-powered stations now contemplated. He further pointed out that the low capital and operating costs of such stations, together with their capacity for working at very high speeds, would render possible substantial reductions in telegraphic rates—a matter obviously of considerable importance to the development of the Empire.

Navy Radio Experiments

Army and Navy Journal, 9 August, 1924.—Experiments which are to take place on the *California* are expected to, in a great degree, determine the character of radio equipment for the fleet. This is a question which is the center of an animated discussion both in the Navy Department and on the fleet.

Five types of outfits have been sent to the *California* for a test and others may be sent later. A high-frequency transmitter with from 2,000 to 3,000 kilocycles and a transmitter designed to cover frequency above 3,000 kilocycles have been ordered for the *California*. A low and intermediate and a high-frequency receiver will also be tested.

Fleet Radio Problem

Army and Navy Journal, 2 August, 1924.—Radio communication has become no small problem for the fleet. Before the broadcasting system became so universal, radio communication on the fleet and with the shore was very simple and could be carried out with ordinary radio equipment. The situation now presents one of the most difficult problems incident to the operation of the fleet.

Some time ago, after extended conferences, the Navy Department adopted a plan of development which is known as the radio plan of 1925. This provides for certain radio equipment for each ship, but the commander in chief of the battle fleet has recently called the attention of the Navy Department that very little progress is being made in carrying out the program.

He points out that three battleships have recently been at the yards for overhauling and that no work was done on their radio equipment. It was understood that the program provided that whenever a ship was in a yard for overhaul the work of bringing her radio equipment up to the 1925 standard was to be done.

The same reply of insufficient funds comes from the Navy Department in connection with this work. The Navy is not only being scrimped in its fuel allowance, but it is unable to keep up with the progress of radio developments on account of the lack of funds. If there is not a change in policy small country towns will have better connections with the great news centers than the commander-in-chief of the fleet will have with his ships. There is no doubt that the naval authorities will ask for a more liberal allowance for radio equipment for the fleet in the next budget.

Radio Compass Improvement

Army and Navy Journal, 9 August, 1924.—Improvements in the radio compass which is now so vital to navigation will result from the recent experiments that have been conducted on the *Reuben James.* They are reported to be of a highly satisfactory character and some radical changes have been recommended in the construction of the radio compass.

It is stated that the compass can be simplified so that its operation will not require the expert knowledge that the present type demands. At the same time more accurate results can be obtained, which will, indeed, be cheering news to the fleet.

Some curious experiences were reported in tests of the various causes for the deviation of radio compasses. A brass flagpole near a compass caused a deviation of eight degrees. A closed loop formed by the mainmast stays caused a deviation of six degrees in the compass. On the other hand a 4-inch gun, even when the muzzle was trained so that it was not over two feet from the radio compass, caused no deviation. It is natural to assume that a steel cannon should have caused a deviation, while no effect was expected from the brass flagpole. For some unexplained reason a contrary effect was developed in these experiments.

MISCELLANEOUS

The Limitation of Naval Strength

The Engineer, 4 July, 1924.—To effect a reduction in the world's armaments by mutual agreement among the nations concerned was, until recently, an idea cherished only by ardent souls who gave little thought to the practical side of international politics. The Washington Conference of 1921-22 proved, however, that the scheme was feasible enough in special, and very favorable, circumstances. Encouraged by the large measure of success which attended the negotiations at Washington, certain people in this country and the United States are urging that a further step be taken in the direction of armament limitation by summoning a second conference to amplify, if not to complete, the work of the first. Proposals to this end have been made more than once in the present Parliament. The government, judging by the Prime Minister's words, sympathizes in principle, but doubts whether the time is ripe for a definite move. It would prefer to see the German reparations tangle unravelled and other pressing problems in Europe brought within sight of solution before it engages in *pourparlers* with other states on the subject of retrenchment in combatant forces. There is no denying the wisdom of this cautious attitude. Armaments being merely the handmaid of policy, it is obviously futile to seek their reduction on an international basis unless and until the major differences outstanding between the various powers have been composed, or at least brought within measurable distance of accommodation. We in Europe are perhaps in a better position than our American friends to observe the intimate connection between military preparedness and national politics. A rapid survey of the present situation suffices to show that those countries, great and small, which

are menaced, or believe themselves to be menaced, by jealous rivals are maintaining military establishments out of proportion to normal requirements. Poland and Roumania are cases in point. France, too, considers a great army and a very powerful air force to be essential to her security. It is useless to urge these powers to cut down their armaments unless we can first persuade them that their safety or their vital interests would not be prejudiced thereby. In other words, it is the disease that calls for treatment, not the symptoms to which it naturally and inevitably gives rise.

When approving the current budget for the United States Navy, both Houses of Congress sanctioned a resolution inviting the President to take measures for the calling of a second conference for the restriction of navies. If Mr. Coolidge has not yet taken action in this matter, it is because he realizes no less clearly than our Prime Minister the futility, not to say the danger, of placing the cart before the horse. The five leading naval powers have already agreed to restrict their fleets by a given formula of relative strength in regard to battleships and aircraft carriers, and since the battleship remains, by almost universal consent, the key factor in every estimate of naval strength, the elimination of competitive building in this type is a great boon to mankind. It is now said that certain of the treaty powers, Japan prominent among them, are devoting to the multiplication of cruisers, submarines, and other minor craft much of the energy they formerly expended on *Dreadnaught* construction. That Japan has laid down or ordered a considerable number of these vessels since the Washington Conference is made evident by her own official figures. France has also embarked on a comparatively large program of so-called "auxiliary" construction within the same period. Hitherto there has been no corresponding activity in the United States or this country, and, in consequence, the balance of naval strength which the treaty sought to establish is already in jeopardy. So far as the British Navy is concerned, that balance will be restored, in part, by the shipbuilding program authorized last March, and about to be put in hand, under which five cruisers and two destroyers will eventually reinforce the fleet. A larger program—consisting of eight cruisers and six gunboats—was adopted by the American Congress some weeks ago, but opponents of the bill have contrived to delay its execution until next year. The result is that the United States Navy is very ill-provided with the ancillary types—e.g., fast cruisers and ocean-going submarines—which promise to assume an entirely new importance now that the heavier ships are so drastically limited in numbers. To remedy this shortage and restore American parity in tonnage would require a very large expenditure of money, which the American public, we gather, is anxious to avoid. The only alternative is to induce the other powers to curtail their "auxiliary" programs, which, if carried out, would leave the American Navy still further in the rear with respect to cruiser and submarine tonnage. It is evident, therefore, that if such limitation could be accomplished through the medium of diplomacy, the United States would stand to gain more than any other party. That, of course, is no reason why the attempt should not be made if the prospects of success were sufficiently bright, but when the conditions antecedent to the first conference are compared with those prevailing now, we think it will be admitted that the atmosphere essential to the smooth negotiation of a fresh treaty of disarmament has yet to be created. In Europe we find France hard at work on a shipbuilding project designed to restore the French Navy to the position it occupied ten years ago. Since French naval opinion discounts the value of the capital ship, the new program is devoted to light cruisers, surface torpedo craft and submarines. Concurrently, the naval aviation service is to be expanded. Remembering how stoutly the French delegates to the Washington Conference held out for a

large allowance of submarine and other "auxiliary" tonnage—at which time practically no vessels of this description were on the stocks in that country—it is at least doubtful whether France would lend a willing ear today to proposals that aimed at cancelling most, if not all, of the ships she is actually constructing. Yet unless France agreed to make a substantial reduction in the submarine program on which she has already embarked, no British Government could consent to restrict its output of anti-submarine types, among which the light cruiser occupies an important place. Here, then, would be the threat of a deadlock at the very outset. Turning to Japan, we find that the British Admiralty return, published in March, credits the Far Eastern Empire with the following men-of-war, building and projected at that date:—Twelve light cruisers, twenty-eight destroyers, and thirty-three submarines. Now the Japanese authorities have stated repeatedly that this amount of new construction is the minimum with which they can be satisfied. Moreover—and this is important to note—it was authorized two years ago, well in advance of the British and American post-conference programs. Apart from the requirements of national defense, it was framed with an eye to the welfare of the shipbuilding industry, which has been very short of work since the Washington Treaty put an end to battleship construction. In these circumstances, it would seem expedient, before arranging a new conference, to sound Japan as to her readiness to forego, either wholly or in part, the reinforcements she has in view for her fleet. Finally, there is the question of Great Britain's right to a specially high allotment of cruiser tonnage on the ground of her dependence on seaborne trade and the consequent necessity of affording it adequate protection. From unofficial statements by American critics, it would appear that the United States is unwilling to concede the British Navy a ratio of cruiser strength higher than its own, and would insist, as in the case of the battle fleets, on absolute equality.

These are but a few of the practical difficulties that must be surmounted before the path lies clear for an extension of naval limitation. To summon a new conference before the views and intentions of the powers interested were known with some degree of certainty would be to court a fiasco, the effect of which on international relations might be very harmful. For this reason the disarmament enthusiasts who are calling loudly for such a conference are doing a real disservice to the cause they have at heart. The apparently complete failure of the Naval Conference held at Rome early in the year, under the auspices of the League of Nations, should be a warning against hasty and ill-considered action in this particular sphere of world politics.

New Arms Conference Call Is Expected This Autumn

Baltimore *Sun*, 16 August, 1924.—Washington, August 15.—President Coolidge has received informal assurances, it was learned today, that the powers of Europe and of Asia will be disposed to consider favorably an invitation to a second disarmament conference once the reparations problems are behind them.

It was with these assurances in mind, it is stated, that Mr. Coolidge announced that he would invite the powers to confer once more with a view to lightening further the burdens which excessive armaments have laid upon the peoples of three continents.

Such an announcement, it was indicated today in official quarters, would scarcely have been made until this government knew approximately how the other governments felt toward another disarmament conference. Governments rarely talk in the open about such matters until they have talked privately to each other and sounded each other out. Although declining to

discuss his informal conversations with the statesmen of Europe upon his return to his desk today, Secretary of State Hughes is believed to have urged upon them the importance to the world at large of a further and sweeping reduction in armaments on both land and sea.

It is well understood here that, if the reparation tangle eventually is straightened out and the prime causes of friction between the European powers are removed or even minimized, both the French and the British will be willing to permit a discussion of land forces at the next conference on armaments.

The British were willing to go into that question at the Washington Conference, provided the French would go along, but when it was realized that France would not consider further demobilization of her army the British, too, backed off from the issue.

Hope is entertained by the American Government that the last of the reparation questions may be disposed of within the next few weeks. This hope is based, of course, upon the assumption that Germany will accept and undertake to carry out in good faith the Dawes plan, which the allied powers have adopted.

If a complete and amicable settlement of the reparation issue is reached in the near future, it is not unlikely that President Coolidge will forward his invitation to a second disarmament conference late in the fall. He would like to get this out before the election, it is said, and, if conditions are favorable, he publicly will propose the conference late in October.

Washington officials have no reason to believe that such a conference would be held until some months after the invitations went out and the acceptances had been received, but that date could be fixed and the place of meeting selected by informal agreement long before the conference itself should convene and organize.

Further limitation of land and sea forces and the codification of international law are the objects which this government hopes to realize in the next international conference which it will propose. President Coolidge indicated this program first in his Associated Press speech and again in his speech of acceptance.

Although there is a binding agreement among the five leading naval powers to build no more capital ships during the next ten years, there is no limitation upon light cruisers, destroyers or submarines; nor is there any limitation upon aircraft, whether operated from land bases or from the decks of men-of-war.

The next conference, it is assumed, will undertake to place some limitation upon craft of these various classes, particularly upon submarines. If the number of submarines is limited, the number of destroyers—used as defensive weapons against undersea craft—automatically will be limited, naval authorities agree.

The big issue that is expected to be raised, should a second disarmament conference be organized, will be that of limiting land forces. France still maintains the most powerful standing army in Europe and Japan the most formidable army in Asia.

As long as France was in conflict with Germany over reparations and other questions, the French Government felt it unsafe to reduce the French Army much below the demobilization point immediately after the Armistice.

But with these questions settled and with another Socialist government in power in France, it is believed in Washington that the French will be willing to reduce materially the strength of their land forces. Moreover, the cost of no part of the French Army will be borne by the Germans after the Dawes plan becomes effective.

Another question that will have to be answered is that of German participation in the next conference. Germany has no sea forces to speak of and

only an army large enough for police purposes, but she will wish to have a hand in the conference, it is assumed here, and unless the other powers veto the idea, an invitation probably will go to the Germans.

Most of the European governments also would favor inviting Russia to send delegates to such a conference, it is believed here, but as long as the United States refuses to accord recognition to the Soviet régime in Moscow there is no likelihood that the Russians will participate through any invitation issued from Washington.

There has been little discussion of the probable place of holding the next conference. American officials would like to have it held in the United States, preferably in Washington, but if the European governments should hold out for London or Paris or Brussels or The Hague, it is doubted if President Coolidge would insist upon Washington.

Have Submarines Made Battleships Obsolete?

By Hector C. Bywater, Baltimore *Sun*, 8 August, 1924.—London, July 23.—Not long after the war a heated controversy broke out in naval circles here on the question of battleship versus mosquito craft. The government's decision in March, 1921, to lay down four new capital ships had excited the wrath of the anti-battleship school, headed by Admiral Sir Percy Scott. It was sheer criminal folly, they declared, to build ships costing $40,000,000 apiece whose value in time of war would be nil.

Experience gained in the late conflict, as interpreted by them, proved the great ship to be obsolete. Its enormous bulk, its thick armor and its ponderous guns offered no defense against the deadly torpedo or the air bomb. Submarines and flying machines had driven the dreadnaught off the seas. The big ship, once the unchallenged arbiter of naval combat, was as antiquated as the wooden three-decker of Nelson's day. In the words of the apocryphal midshipman whom Sir Percy Scott is so fond of quoting, "it was no damned use at all." A few, a very few, officers of senior rank took sides with Sir Percy on this question; but an overwhelming majority of his brother officers voiced their unwavering faith in the primacy of the dreadnaught.

One significant feature of the debate was this: Almost all the battleship's champions were officers who had handled or served in such vessels throughout the World War, while Sir Percy himself and most of his fellow-partisans had seen no active service during the campaign, and therefore lacked personal knowledge of modern tactics; but this fact, important though it was, did not carry much weight with the general public. Sir Percy wields a ready pen; he has a knack of driving home a point by "damnable reiteration" and a genius for side-stepping the direct issue. No one has yet been able to pin him down on a single one of those technical points which really dominate the whole question.

By studiously ignoring the difference between ships of old and new design he has created in the public mind an impression that the largest dreadnaught now afloat would straightway founder if hit by a single torpedo. In the next war, he tells us, every battleship that shows its nose outside harbor will infallibly be sunk. On being reminded that no battleship of the British Grand Fleet was even damaged by submarine attack in four years of war, he retorts that the German *U*-boat captains had positive orders not to molest warships, but to sink merchantmen only, though he must know quite well that such orders were not issued until months of fruitless effort had persuaded the Germans of the futility of sending their *U*-boats to attack the well-guarded Grand Fleet.

When the four projected battle cruisers were canceled by the Washington Treaty and Britain amended her building program to two 35,000-ton battle-

ships the "antis" launched another offensive which still continues in a desultory manner, though the ships have been constructing for the last eighteen months. When we hear it said that the battleship is dead, we are meant to understand that it is too easily sinkable to be worth building. Except for this reputed vulnerability its status would be assured, for in no other type is so large a sum of fighting power embodied.

What can the despised dreadnaught do? It can steam from 6,000 to 10,000 miles independent of base facilities; when need arises it can travel at speeds ranging from twenty-five to thirty-five miles an hour, according to type. It carries eight or twelve guns of power and range which are unequaled by any mobile ordnance ashore and can hurl their giant high-explosive shells a distance of eighteen miles. All other surface men-of-war must flee when they sight a hostile dreadnaught, for a solitary ship of this type could annihilate a whole squadron of lesser craft, including even the 10,000-ton cruisers to which the Washington Treaty is giving birth. The only antagonist which its guns may not be able to destroy are the submarine and the airplane, but even against these it is by no means defenseless.

We shall gain a more accurate notion of what the dreadnaught really is and what its functions are if we treat it as a floating platform designed to mount the heaviest cannon which may be taken to sea. Now if that platform cannot be given a reasonable degree of immunity from sinking, or even from such disablement as would prevent the guns being worked, then the dreadnaught is obviously not worth perpetuating.

If, on the other hand, the platform can be given such a reserve of buoyancy as would render it very hard to sink, then the case for the dreadnaught is proved up to the hilt, for in offensive power it is unrivaled. Recognition of this problem has led naval designers to think out new methods of preserving the buoyancy and stability of great battleships. On the success which has attended their efforts depends the answer to the question whether the dreadnaught is or is not a useless survival of the past. It is a question of real concern, not to naval men only, but to every citizen who provides the money for naval armaments and who looks to them for the protection of his person and his property.

By all the principal admiralties of the world the dreadnaught is still regarded as the backbone of sea power; but if their judgment should be wrong, if the dreadnaught is, in fact, completely at the mercy of submarine and airplane, then the whole scheme of naval defense as it now exists must be fundamentally unsound, and all calculations of national security based thereupon are liable to be falsified when an emergency develops.

To find how this problem of protecting the battleship against the new methods of attack—particularly by submarine—has been dealt with, we must go back nine years to the date at which its solution was first realized to be vital. In the spring of 1915, when the British invasion of Gallipoli was proceeding, German submarines reached the Dardanelles, where they contrived to sink two old British battleships. Nets were found to be useless against this menace, for the torpedoes cut their way through, and as the ships attacked had never been designed to resist the impact of modern torpedoes, one hit was usually enough to destroy their buoyancy; so the other British ships were compelled to withdraw into a sheltered harbor, and for a time it looked as if the whole Dardanelles campaign was to be checked and thwarted by a couple of puny submarines.

But the antidote was already on the way. A few weeks later there steamed—"waddled" was the expression used by an eyewitness—into Mudros Harbor a ship of which no sailor had ever seen the like. This grotesque newcomer was chiefly remarkable for the broad external cofferdam or "blister" which girdled the hull. This was the famous anti-

torpedo bulge, and the ship wearing it was the first of the big monitors which Lord Fisher had ordered early in the war.

It was soon evident that vessels so equipped had nothing to fear from submarines. One or two were torpedoed, but the explosions caused only superficial damage and interfered in no way with the ship's battle-worthiness. In October, 1917, the bulged monitor *Erebus* was struck fairly amidships by a German electric-controlled boat loaded with 500 pounds of T.N.T. Despite the terrific explosion, very little harm was done; the bulge suffered injury, but the ship did not leak at all. A sister ship, the *Terror*, attacked by German destroyers, received three torpedoes at once, yet was able to return to port, where she was repaired in a fortnight. With these results in view it was clear that an effective defense against the torpedo had been found.

Since then the bulge has been widely adopted for the major types of warships. No doubt it tends to hamper speed, but this difficulty can be mitigated by specially molding the form of the bulge. The British *Hood* is fitted with bulges, yet she is the swiftest capital ship in the world. Five other British battleships of the *Royal Sovereign* class have now been furnished with bulges, according to statements in the press.

Japan has adopted the system, which is also to be contemplated for the six American battleships, *New York, Texas, Arkansas, Wyoming, Utah* and *Florida*, about to undergo modernization. Replying in a statement dated May 8 this year to certain charges by Mr. Shearer, the Washington Navy Department said: "As far as our information goes, when the *Rodney* and *Nelson* are completed the British will have equipped ten of their twenty battleships with blisters or their equivalent. England has ten battleships that will need blisters. The United States has five of its eighteen fitted with the equivalent of blisters and has thirteen ships that need blisters." The five American ships referred to are, presumably, the three *Marylands* and the *California* and *Tennessee*, the hulls of which are so well partitioned by bulkheading that many torpedo hits would be required to disable them.

In time, no doubt, most if not all of the capital ships which the various navies retain under the treaty will have bulges or something as good. When that is the case these great ships will have little to fear from submarine attacks. True, torpedoes of enhanced power may be introduced, but since space inside a submarine is very limited the use of torpedoes longer and heavier than the present pattern would be attended with serious drawbacks. Bombs from aircraft, exploding alongside, might be more dangerous than torpedoes, but here, also, the bulge will help to avert fatal injury to the hull proper.

Those who condemn the dreadnaught as obsolete are condemning, by implication, every other type of surface warship. If the dreadnaught, with its stout hull, bulged and minutely subdivided, is to be put out of business by torpedo or bomb, how much more easily would the airplane carrier and the cruiser be disposed of by the same weapons! With a strange inconsistency, many who announce the demise of the dreadnaught urge us in the next breath to build great airplane carriers wherewith the torpedo planes and the bombers may be brought within striking distance of the enemy's battle fleet. They seem to imagine that the airplane carrier is in no danger from submarines or aircraft, the truth being that it is far more vulnerable to their assault than the dreadnaught.

When arguments and counter-arguments have been duly weighed an unbiased mind is led to conclude that the naval authorities, in relying on capital ships as the bedrock of sea power, have reason on their side. The great armored battleship of today, with its coat of mail, torpedo-proof

hull and heavy artillery, is the most formidable fighting machine afloat, and probably will remain so for years to come.

Coast Defense

Engineering, 1 August, 1924.—By a singular chance, the problems of coast defense have been examined almost simultaneously in Washington and Paris. Recently the Committee on Naval Affairs in the American House of Representatives considered a proposal to buy land for a naval air station on the coast of Washington. The discussion of this comparatively insignificant item on the agenda led the committee to a question of far greater importance: If the coasts of the United States are attacked, what share in the defense falls to the Navy and what to the Army? Highly placed officers in both services were called before the committee and examined, and though the discussion was long, rambling and incoherent, and reported in complicated language, it sufficed to show that the American high command has organized its coastal defense on certain well-tried principles. The French Parliament, on the other hand, was not led to the problems of coast defense by questions of another kind. The matter has been explicitly studied by a committee of forty deputies, and reported on by Monsieur Georges Boussenot with the precision of thought and language for which his countrymen are justly famous.

The American system of coast defense is, evidently, that the Navy shall deal with the floating, mobile forces of an attacking group, but that the Army shall have charge of all fixed fortifications ashore, whether they protect naval establishments or not. This, at all events, is the meaning which would ordinarily be given to Admiral Moffet's statement: "It is admitted by all that the first line of defense is the main fleet; that the second line of defense would be the auxiliary vessels of the fleet . . . and that the third line of defense is our coastal fortifications."

The system which the French commissioners recommend is very different. In their opinion, the naval command must control both the mobile defense afloat and the fixed defenses ashore, and they have added a historical review of the whole question to support their conclusions. For centuries the coast-guard militia (*milices garde côtes*) and the local admiral were responsible for the defense of the French coasts; but in 1759 the duty of protecting the "sea frontiers and fortified naval bases" was transferred to the army. It is open to argument whether this arrangement was theoretically correct or not; but it is beyond all question that the high military authorities, being perpetually occupied with continental campaigns, utterly neglected the coastal defenses of the country. The administrative change of 1759 has been much criticized; commission after commission has studied the question and the *projet de loi* is, as the commissioners explain, intended to close a controversy which is more than a century old.

The commissioners think that the French coasts may be attacked in four different ways: (1) they may be bombarded by light forces assisted by bombing and spotting airplanes; (2) they may be attacked by submarines of the 1,600-ton type armed with 10-inch or 12-inch guns, also assisted by spotting aeroplanes; (3) the entrances to the war harbors may be blocked; and (4) landings in force may be carried out at points of industrial or naval importance. The first three forms of attack require no explanation, but the fourth must be examined rather closely if the report of the commission is to be understood.

When a country's neighbors have such a naval superiority over her that they dominate her sea communications, then, in theory at least, that country can be invaded from the sea. The commissioners are, however, careful to say, that, in their opinion, France's present naval weakness does

not expose her to a danger of the kind. For reasons which they have not given, they express themselves convinced that France cannot be invaded from the sea, in the strict sense of the word; but they define the dangers to which their coasts are exposed very explicitly: "It can hardly be assumed that a real, invading army will attack our coasts; but it would be most unwise to say that landing operations with a limited military or political object are impossible. . . . The islands off our coasts, and our colonial possessions are very vulnerable points. Their loss might hamper our naval operations most seriously, and it is our duty to do everything in our power to protect them adequately. Rapid strokes by a force of from three to four battalions against important coastal points such as aerodromes, industries, and shipyards are quite feasible operations, if prepared carefully and carried through with the necessary energy. Their consequences might be of the utmost gravity, and one would be singularly lacking in judgment and imagination if one ignored the possibility."

Attacks of this kind will be met by coastal artillery of all calibers, anti-aircraft guns, and obstructions such as minefields and explosive barrages in the first place; and, in the second, by surface and submarine flotillas and the coast defense air force. The commissioners have taken the strictly logical view that these fixed and mobile defenses ought not to be under a divided command; and that all means of resisting an attack from the sea should be organized and set in motion by the local naval commander.

This is the exact opposite of our practice, and, as far as can be seen, of the American system as well. Our rule of command, in such cases, is that a naval officer is in sole charge at sea, and an army officer acts equally independently on land. It is worth while to examine the reasons behind opposing systems. If a country has a powerful surface fleet its coastal defense measures differ radically from those of a country with an indifferent navy. In the first case, attacks are dealt with by confronting the attacking naval force by another so powerful that all attempts against the coast have to be broken off. Armed landings are disposed of by cutting the communications of the landing force, that is, by sinking its transports, and driving off its naval supports. This system makes the shore defenses relatively independent of the naval command. The naval forces detailed to oppose a coastal attack, or an armed landing, are but little concerned with the amount of resistance which is put up by the shore, as their sole preoccupation is to bring the attacking squadrons to action. The attack may be dealt with before or after it has been delivered, by an engagement fought many miles away from the bombarded town, or the place of the landing. The test of a successful resistance is always that the attacking force has not been allowed to complete its operations unfought. The British and American high commands can assume that their naval power will always suffice to deal with coastal attacks by this method, and have laid their defense plans accordingly.

To a country like France the problem is quite different. Her naval weakness obliges her to deal with coastal attacks *in situ;* as she cannot defeat or disperse them by a purely naval counter attack; and the commissioners find it unreasonable to divide the forces upon whom the duty of resistance falls, between two separate commands. The scouting aeroplanes, the submarines, the minelayers, the destroyers, the shore batteries and their supporting troops are, therefore, all placed at the disposal of the naval commanders-in-chief of the maritime frontiers.

The report of M. Georges Boussenot and the commissioners deal with principles only; but it contains one instructive passage upon the kind of material which will be used in French coastal defense. "Batteries of light, very rapid firing, artillery are indispensable for defending nets and obstructions at the entrances of large defended harbors; they alone are capable

of stopping attempts made by light craft or by engines controlled by hertzian waves. Medium calibered artillery (5.5 inches to 6.2 inches) is the only efficient means of defense against night bombardments by light cruisers and destroyers . . . and every one of our large naval or commercial ports should be defended by at least two or three batteries of heavy guns (11.8 inches to 13.4 inches)." Certain theorists have objected that a coast can be bombarded from a distance of twenty miles by naval artillery directed from aeroplanes. The answer to the criticism is simple. "If a monitor can bombard a heavy battery from a distance of forty kilometers, is it reasonable to allow her to come closer in and so make her bombardment more accurate and telling, by suppressing the heavy batteries which force her to operate at extreme range?"

The French naval command has lost no time in training their squadrons and personnel in the problems which the Chamber of Deputies has been examining. During the last days of March Vice-admiral Docteur, with the *Diderot* and nine destroyers, and a considerable military force, attempted a surprise landing near Lorient. It was opposed by Vice-admiral Jehenne, the commander-in-chief of the maritime frontier, who had a considerable force of infantry and artillery placed under his orders. The results of the exercise are, of course, kept secret; but it is evident that the attack, and the method of warding it off, were both inspired by the *projet de loi sur l'organisation et la défense des frontières maritimes*, which was the subject matter of M. Boussenot's able and instructive report.

The New Stupidity of German Reaction

By Hector C. Bywater, *Baltimore Sun*, 13 August, 1924.—London, July 15.—"Patridiots" is the unkind but not altogether inapt nickname by which the German Nationalists are known to their Liberal opponents.

Certainly the Nationalist policy since the war has been incredibly short-sighted and obtuse. To take its latest manifestation—the adoption of Admiral von Tirpitz as the party candidate for Chancellor: what must be the mental state of those who advocate this appointment on the ground that it would be viewed with favor in London and Paris?

"Tirpitz," we read in the principal Nationalist organ, "is one of the few German leaders whose prestige in foreign eyes remains unimpaired. He is a man whom English politicians know they can trust. They admire him for the pertinacity with which he worked for peace before the war, and not less for the determination with which he fought England when circumstances beyond his control had made the conflict inevitable."

If this is really what the Nationalists believe, one can only marvel at their powers of self-deception. So far from being trusted or admired, Tirpitz is regarded here as one of the men who were primarily responsible for the World War. His appointment to the Chancellorship, or to any other high office in the German state, would rightly be construed both as an affront and a challenge to the entente powers. It would afford unmistakable proof that the German war party were strong enough not merely to influence but completely to dominate their country's policy. It would be held to confirm the worst fears of those who have always predicted a war of revenge at Germany's selected moment.

Tirpitz is the incarnation of Prussian militarism in its most dangerous form. Above all, he is the bitterest and least placable enemy which this country has had in modern times. In his case hatred for England amounted to a morbid passion, which until quite recently he was at no pains to conceal. Last year, it is true, he told an interviewer that the English had misjudged him, that his sentiments toward them were friendly. The English,

however, are justly suspicious of this sudden amity on the part of one who labored all his life to compass their destruction.

That Anglo-German rivalry in naval armaments was one among, if not positively the most direct of all, the causes which contributed to the making of the World War is a truth now universally admitted. It is customary to award the whole blame for this rivalry to ex-Kaiser Wilhelm, but, though Wilhelm was the moving spirit, his efforts would have been futile without the support of Tirpitz.

Wilhelm conceived the notion of building a great navy as an instrument for giving effect to his grandiose plans of imperial expansion. For ten years after his accession to the throne he tried by every means to instill into the German people his own enthusiasm for sea power. All in vain. Session after session the Reichstag cut down with a merciless hand the appropriation for the navy. Wilhelm fumed; he raced up and down the country making speeches about the "bitter need" for a strong navy; he had Reichstag deputies and prominent journalists up at the castle, where he harangued them on the glorious future that awaited Germany once she had possessed herself of a big fleet, but the country would not be persuaded. It did not see the use of spending countless millions on ironclads when it already had the mightiest army in the world.

So things went on until 1897. In that year Tirpitz, a junior flag officer serving on the China station, was suddenly recalled to Berlin, where he found himself appointed Secretary of the Navy in succession to Admiral Hollman. Tirpitz had been reported to the Kaiser as an officer who had shown an extraordinary aptitude for parliamentary business during a spell of duty at the Navy Office a few years beforehand, and it occurred to Wilhelm that here was a man who might cajole the obstinate deputies into voting more generous credits for the navy.

Never was appointment more brilliantly justified. A few months after he had taken office Tirpitz introduced the first of his famous naval programs. It planned the formation of a fleet of seventeen battleships and thirty-six cruisers, with all the requisite auxiliaries, personnel and shore establishments. Nothing so ambitious as this had ever been proposed before. The old hands assured Tirpitz that the measure had no chance of getting through the Reichstag without suffering grievous mutilation; he would be lucky, they said, if he got half the ships, but he refused to abate a single item. He told the deputies that this program was the absolute minimum required to safeguard the country, and they were so impressed with his eloquence, or hypnotized by his forceful personality, that they ended by giving him everything he asked for.

True, the circumstances were all in his favor. Owing to the Jameson raid into the Transvaal and other causes, the German people were bitterly incensed against England. Their wrath was artificially stimulated by the official press, which pilloried England as an arrogant, tyrannical power which was doing its utmost to thwart the legitimate ambitions of Germany in the direction of foreign trade and overseas expansion.

Anglophobia was the strongest weapon in the armory of Tirpitz. He wielded it without scruple and with telling effect. In 1900, when England, then at war with Boers, was smarting under a series of reverses unparalleled in her military history, he seized the opportunity to bring forward an "amendment" to the navy bill of 1898, the effect of which was to double the number of battleships and effect a proportionate increase in other branches of the naval service. This great program was adopted with enthusiasm, the more so because of its notorious preamble, which laid down that Germany must have a fleet so strong that "even the mightiest naval power" would hesitate to try conclusions with it.

In this blunt way Germany, at the instigation of Tirpitz, stood out before

the whole world as England's rival for the trident. Henceforth there could be no misunderstanding as to the aim of German naval policy. England could do no other than take up the challenge. From 1900 onward the two powers were engaged in a feverish shipbuilding competition. Every few years brought a fresh "modification" of the German navy bill, always on the upward grade. It was last amended in 1912, by which time Germany had already outstripped France and the United States and won to second place among the naval powers with a good prospect, she believed, of clutching the trident in her own fist a few years hence.

Never before had the world witnessed such an intensive rivalry in armaments. We all see now, as many saw then, that only one dénouement was possible. For England to have yielded her premier place on the sea would have meant not only the dissolution of the British Empire but the ultimate defeat and subjugation of England herself. Sooner or later she would have had to fight for life, or else become a despised vassal of Germany's. Which alternative was she likely to choose, having regard to her history, her traditions and the character of her people? If the Kaiser and Tirpitz did not foresee the inevitable outcome of the course they were pursuing, their purblindness is beyond belief. Assuming them to be men of average intelligence, they must have known that war with England was merely a question of time if they persisted in their effort to overthrow her naval supremacy. The fact that they did so persist proves them guilty of having deliberately provoked war.

Apart from his sinister share in the war conspiracy, the known responsibility of Tirpitz for *U*-boat frightfulness does not add to his popularity in this country. He instituted the sink-at-sight policy, which caused the death of many thousands of non-combatants. Furthermore, it was at his insistent demand that the Zeppelins were sent to shower bombs on undefended English towns. His rabid hatred for everything English repeatedly found expression during the war, in word as well as in deed.

Since the peace he has worked hand in glove with the parties of the extreme Right, whose watchword is "Vengeance." He is more dangerous than Ludendorff, because infinitely more subtle. Unlike the military men, who are preoccupied with the idea of avenging themselves on France, he has never swerved from his early conviction that England is the chief and most formidable enemy.

This, then, is the man whom the Nationalists have chosen for their leader and their candidate for Chancellor. Whether he will ever attain that office is more than doubtful. However much he may be lauded by his political friends, the German nation at large remains cold and even hostile to him, for it now realizes that his naval policy was mainly instrumental in bringing the war, with all its ruinous consequences, upon the Fatherland. *"Heute denkt und nennt kein wacher Deutscher den Namen Tirpitz anders als mit Bekummernis,"* wrote one candid critic not long ago. *"Das Volk hat in vollem Umfang begriffen, was Alles es Tirpitz verdankt—Tirpitz, dem Torpedeur deutschen Glücks, deutscher Zufriedenheit and deutschen Wohlstands."* ("Today no thoughtful German thinks or speaks of Tirpitz other than with grief. The people have realized to fullest extent what they are indebted to Tirpitz for—Tirpitz, who torpedoed German good fortune, German happiness and German prosperity.")

If that be his reputation among the masses, even the Nationalists may hesitate when their hour strikes—if it strikes at all—to nominate a leader so bankrupt of credit and esteem. Most of the Berlin correspondents agree that Tirpitz has no political future. As for his past, it is well symbolized by the German fleet which lies rusting, fathoms deep, at the bottom of the sea.

CURRENT NAVAL AND PROFESSIONAL PAPERS

"The Navy. The Left Wing of the Allied Armies."—By Capitaine de Vaisseau Thomazi, Revue Militaire Francaise. Translated by Brigadier General W. Evans in the *Journal of the Royal Artillery*.

"Steering Ships in Shallow Water."—Summer meeting Institute of Naval Architects. *The Engineer*, 4 July, 1924.

"Ten Years' Progress in Marine Propulsion."—By Sir Archibald C. Ross, K. B. E., President, Northeast Coast Institution. *The Engineer*, 4 July, 1924.

"The Military Problems Raised by the World War."—By General Alvaro Obregon, President of the United States of Mexico. *The Fortnightly Review*, July, 1924.

NOTES ON INTERNATIONAL AFFAIRS

FROM JULY 23 TO AUGUST 23

PREPARED BY

PROFESSOR ALLAN WESTCOTT, U. S. NAVAL ACADEMY

RESULTS OF LONDON CONFERENCE

AGREEMENT BETWEEN GERMANY AND ALLIES.—The "London Conference on Application of the Plan Presented to the Reparation Commission on April 9, 1924, by the First Committee of Experts, Appointed by it on November 30, 1923," reached final agreement on August 16, and embodied the results in a protocol with four annexes, signed by Germany and the Allied Powers. The representatives of the United States, "with specifically limited powers," did not sign.

Preliminary agreement having been reached by the allied powers on August 2, the German representatives were then invited to come to London for final negotiations which were brought to a successful result after about ten days of discussion. The chief stumbling block in these negotiations was the date of French and Belgian evacuation of the Ruhr. In the end the French and Belgian Premiers, in letters to the German Chancellor, pledged their governments to complete military evacuation by August 16, 1925, one year from the date of signing the protocol.

Referring to the outcome, Prime Minister MacDonald declared it "the first really negotiated document since the war." According to the terms of the agreement, the execution of the "Dawes Plan" is contingent upon the successful raising of the proposed loan to Germany of 800,000,000 gold marks.

It was expected that the agreement would be ratified without difficulty by the German and French parliaments, although French Nationalists protested against the "bartering away" of France's strong position in the Ruhr.

The final agreement was greatly assisted by the American representatives, Ambassador Kellogg and Colonel Logan, the American observer on the Reparation Commission, and by the visit of Secretary Hughes to European capitals during the progress of the negotiations.

TERMS OF PROTOCOL.—The protocol itself is merely a statement that agreements have been reached and are mutually interdependent.

Annex 1 is a repetition of the agreement of August 9 between the Reparation Commission and Germany to put into execution the Dawes Plan and to submit disputes of interpretation to arbitration.

Annex 2 provides elaborate machinery for arbitration in case of disagreement over interpretation. Three arbitrators are to be appointed for five years, one by the Reparation Commission, one by Germany, and one by agreement, or failing agreement, by the president of the Permanent Court of International Justice. Special committees, with American or neutral chairmen, are provided to settle disputes over programs of deliveries in kind, and "financial maneuvers" called for in execution of the plan.

Annex 3 embodies agreements between the allied governments and Germany as regards financial cooperation, removal of customs restrictions between occupied and unoccupied Germany, and amnesty for political prisoners in occupied regions.

Annex 4 provides for an American member of the Reparation Commission, to act and vote on any question relating to the Dawes Plan. The Reparation Commission, thus constituted, will decide any question of German default, provided, however, that any member of the commission may appeal the decision within eight days to a neutral arbitral commission of three who shall be appointed either unanimously by the Reparation Commission, or failing unanimity, by the president of the Permanent Court of Justice. The chairman of this commission must be a United States citizen.

PRELIMINARY AGREEMENT OF ALLIES.—Prior to inviting German representatives to London, the allied powers in preliminary discussions reached agreement on all points of policy relative to the execution of the Dawes Plan. The chief difficulty was as to who should decide a question of German default. This was settled by provision for an American member of the Reparation Commission, as stated above.

It was further agreed that a conference on inter-allied debts should be held in Paris in the near future. It was announced that an American representative would attend.

GREAT BRITAIN

ULSTER BOUNDARY PROBLEM.—In the House of Commons on August 1, British Colonial Secretary J. H. Thomas stated that, in case the government of Northern Ireland refused to appoint a representative to the Boundary Commission, provided by the treaty, to determine the boundary between Northern Ireland and the Irish Free State, the British government would introduce a bill designed to bring about the results intended by the treaty.

The attitude of the Ulster government has been that it would appoint a representative on the Boundary Commission only provided it was clearly understood that the function of the commission was to adjust the boundary and not transfer whole tracts of territory.

ANGLO-RUSSIAN TREATIES SIGNED.—On August 6 it was announced in parliament that the conference of British and Soviet representatives in London had agreed upon both a general and a commercial treaty. The commercial treaty, it was stated, followed the usual lines, save that, in

view of the Soviet government monopoly of foreign trade, diplomatic concessions were granted to Russian government trade delegates in British possessions. (It has been asserted that, in the case of other governments, trade delegates thus privileged have been active in propaganda.)

On the British promise of a loan, the Soviet representatives pledged their government not to sequestrate foreign property in Russia, to cease propaganda in British Dominions, and to recognize the debt to British creditors as fixed later by a claims commission.

EASTERN EUROPE

SOVIET ACTIVITY IN BALKANS.—N. Y. *Times*, August 2.—Vienna, August 1.—According to a dispatch from Athens, the Greek General Staff has informed the Foreign Office that the army has received orders to pursue any Bulgarian *comitadjis* making raids into Greek Macedonia, and has requested the Greek Foreign Office to inform the great powers of this decision.

The unrest is said to be largely stirred up by the Soviet Government, which finds fruitful soil for its propaganda in the still disorganized countries of the peninsula. Enormous sums are being spent, it is said, in Bulgaria, Greece and Rumania, where the Bolsheviki have far-reaching organizations, which are said to be behind the Bulgarian raids into Greece.

The Communist strength in Bulgaria is still considerable, and even growing, and is reinforced by the intense dissatisfaction of the Bulgarian people with the territorial settlement in Macedonia. As in Hungary, the policy of the allies toward Bulgaria has tended to bring about a working agreement between Communists and Nationalists, the former opposing the entente on the ground that it is capitalistic and the latter as pro-Serbian. Moscow is naturally exploiting Bulgarian bitterness in the hope of upsetting the none too stable settlement in Southeastern Europe.

Paris, August 1.—The present situation in the Balkans is known here to present two grave features: First, Bolshevist agitation, financed by Bulgaria and equipped by Soviet Russia, and, second, Macedonian agitation in those parts of Macedonia belonging to Serbia and Greece, under peace treaties.

From the best Bulgarian sources the *Tribune* is informed that the Communistic revolts which have broken out in the various country districts of Bulgaria have been armed, uniformed and equipped by Soviet money, coming into Bulgaria from Vienna. It is declared that these revolts—which in the past week have been bloodily repressed—take the form of manifestations in favor of the Stambulisky party, which was overthrown in the last Bulgarian revolution, when Premier Stambulisky was assassinated and a new government established.

From the exterior Bulgaria is faced with a real conflict with Serbia and Greece if the aggressions of the Macedonian and Bulgarian *comitajis*, or frontier guerillas, continue.

BOOK REVIEWS

BROWN'S COMPLETED BURWOOD—New edition, Revised and Enlarged. James Brown & Son, Glasgow. 10/6 Net.

A book of Tables for Bearings from Horizon to Meridian of celestial bodies; Latitudes 30° to 60°, Declinations 0° to 23°. Latitude and Declination of the same name and of contrary names.

These tables are similar to the "Red Azimuth" Tables in use in the U. S. Navy. Tabulations are for every degree of latitude, every degree of declination and each four minutes of time. There is nothing new or of special interest save the well-discussed, subsidiary uses, including great circle sailing and a special table for the "Conversion of Radio Bearings to Mercatorial."

The narrow limits of latitude restrict materially the use of the publication. To the practical navigator it confesses frankly that mental interpolation and approximate azimuth only are sufficient for the usual line of position. That's something!

W. E. M.

SECRETARY'S NOTES

Membership

Present Membership, 4367. Changes since last report: New Members, 11. Resignations, 2. Deaths, 2. Total Increase, 7. New members joining since last report:

Williams, R. W., Captain, U.S.M.C.
Doxey, J. L., Captain, U.S.M.C.
Murray, C. I., Captain, U.S.M.C.
Quale, A. M., Ensign, U.S.N.
Harrison, H. H., Ensign, U.S.N.
Tebbs, R. H., Jr., Major, U.S.M.C.
Snyder, H. R., Lieut. Comdr. (SC) U.S.N.R.F.
Belford, H. G., Ensign, U.S.C.G.
Sylvester, E. W., Lieut., (CC) U.S.N.
Worledge, V. W., Lieut., U.S.M.C.
Stout, R. F., Ensign, U.S.N.

Omission of Credit

In the September issue there was published an article, "Condition of the American Navy," by Lieut. Commander Sydney Ballou, U.S.N.R.F., reprinted from the *San Francisco Chronicle*. It was the intention to credit that paper with the original publication of the article, but the credit line was unfortunately omitted through error.

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